FOOD MANUFACTURE

Incorporating Food Industries Weekly

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FOOD MANUFACTURE

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CONTENTS

	Page
Editorial	265
Canned Beef—Mexican Style. *Robert M. Riddell, Jr.*	269
Planning a Dietary Survey	272
Progress in Agricultural Research	273
Ministry of Food—Statutory Instruments	274
The Determination of Moisture in Organic Substances. Part I. *C. F. M. Fryd, B.Sc., A.R.C.S., A.R.I.C.*	275
Estimation of Vitamin E. *E. Eden and V. H. Booth*	279
The Pasteurisation of Liquid Egg	283
Long Ashton's Cider Sampling Day	287
Survey of World Grain Crops	288
Efficient Operation of Drying Plant. Part V. *Leo Walter, A.M.I.Mech.E., A.M.I.PlantE.*	289
The World's Dairy Products	293
Trade News	294
Information and Advice	307
Recent Patents, Trade Marks, and New Companies	308

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FOOD MANUFACTURE

Vol. XXV, No. 7 July 1, 1950

Mr. Bevan Signs off Food

A THREEPENNY document issued in May by the Ministry of Health is modest enough in size but much less modest in its significance. Entitled "The First Report of the Definition of Drugs Joint Sub-Committee," it virtually removes a large number of food-type products from the list of materials which doctors may prescribe for medical benefit under the National Health Service. The restriction is not absolute; it is, however, effective, for should a doctor prescribe such foodstuffs, he is warned that their cost may later be recovered from *him*.

Having regard to the enormous bill so far presented by the National Health Service and its danger to the nation's economics, no one with a reasonably balanced outlook will criticise any general regulations or recommendations which can bring about some economy.

Substances which are primarily nutritional and can be used as diet supplements by healthy people must be classed as foods even if they can also be used as medicaments. Some complex preparations, of which the main constituents are foods, must be classed as foods even when they form the vehicle for drugs or medicinal agents. On the other hand, preparations whose primary purpose is to provide nourishment in established disease can be regarded as drugs, but the doctor must be prepared to justify prescribing these as necessary for the treatment of his patients. Even these firm principles still leave outstanding borderline cases. For example, glucose is primarily a food, but when given by injection it could be regarded as a drug.

Sixty-four milk food products, most of them nationally known preparations, are henceforward defined as foods and cannot be prescribed. Those which are not actually named are tacitly covered by the final phrase "and similar preparations." Vitamin and glucose products, malt extracts, meat and vegetable extracts and juices, mineral and spa waters, and a long list of miscellaneous preparations make their exit from the drug department. If people feel that they need these foods for their health, it is now made clear that they must, as in the pre-Bevan past, buy them for themselves.

Another class which has been removed from prescription is called "liquid foods and wines," included in which are apple juice and fruit squashes. There will be general agreement that these are not legitimate needs in most cases of medical treatment, but it is more surprising to find in this group one well-known vitamin C product, blackcurrant syrup. It was this same product which the Ministry of Health issued to children during the war. There is, therefore, strong evidence for retaining it in the prescribable list—evidence provided on a large scale by the Ministry which now removes it from the National Health Service armoury. The prescribing of such products, which have so emphatically displayed their medicinal values, might still have been left to the discretion of medical practitioners.

A Veteran Subsidy

In the Civil Estimates for 1950/51 one of the most striking Ministry of Food changes is the reduction in the annual sum that is paid to the British Sugar Corporation. The reduction is substantial—from £4 million down to £$\frac{3}{4}$ million. This must be regarded as a most significant development, for the beet sugar subsidy is no child of World War II; it is the veteran of the subsidies and is at least a generation older than the Ministry of Food itself. It has cost the country between £4 and £6 million per annum for a quarter of a century, and between the wars it was frequently the subject of fierce controversy.

It is somewhat paradoxical that it should be so greatly reduced at a time when it is only one of a number of food subsidies. The old adage of safety in numbers does not seem to have applied. Instead, the very conditions which have led to the other subsidies would seem to have enabled beet sugar to stand more firmly on its own economic feet.

Sugar beet is a much more recent introduction to British farming than is the case in most other European countries. In Great Britain there was only a token-sized acreage before 1914, but the conditions during World War I led to a considerable expansion. By 1924, however, it was obvious that sugar from home-grown beet could not compete with sugar imported from the cane plantations. The Government decided to assist the industry with a ten-year subsidy scheme. As a result, between 1924 and 1934 the industry expanded enormously. The beet

acreage rose from 22,000 to nearly 400,000; the number of factories from 3 to 18; the annual tonnage of beet sugar from 24,000 to 615,000. But in these ten years the total subsidy paid was £40 million.

The policy had many critics. There were three main reasons why assistance was given. Arable farming was in an increasingly serious decline and the expanding sugar beet crop helped to arrest this. It was also a crop requiring plenty of labour and its large-scale cultivation prevented much agricultural unemployment. Lastly, it was believed to be of some military value to have a well-established home-produced sugar industry.

When the subsidy scheme started in 1924, it was anticipated that in ten years the beet sugar industry would become self-supporting. Despite progress and expansion, this hope proved as empty in 1934 as it had been in 1924, not because beet sugar costs had remained inordinately high, but because in the same ten years the cane sugar growers had greatly increased their efficiency and brought the world price of sugar down to a level that no one in 1924 had supposed possible.

In the early thirties the total costs of producing beet sugar were nearly three times the cost of importing the same amount of cane sugar.

Steady falls in the price of cane sugar meant that no country without a suitable climate for cane growing could hope to have a home-produced sugar industry without heavy subsidies.

In 1935 the Greene Committee was set up by the Government to investigate the wisdom or otherwise of fostering sugar beet; its majority report recommended that the subsidies should cease, though a minority report advised continuation on the grounds that arable agriculture should be assisted.

The Government decided, however, not to abandon the new industry, and a fresh Act amalgamated all the sugar factories into the British Sugar Corporation and limited annual subsidy payments to an output of 560,000 tons of sugar. A commission was created—the Sugar Commission—to supervise the whole industry. The annual cost of the subsidy after 1935 was about £5 million and sometimes more.

Up to the outbreak of World War II the policy of subsidised beet sugar was still fiercely criticised. The fact that altogether more than £70 million had been spent from 1924 to 1939 in these subsidies was certainly controversial.

Even in the war years the tonnage of beet sugar did not exceed the annual limit of 560,000 tons. The highest war-time yield was 516,000 tons in 1942/43. However, in 1946/47 and again in 1948/49, this tonnage was almost reached; these were years of exceptionally sunny growing seasons and the highest crops per acre ever recorded were produced.

Since 1942 the beet acreage has remained fairly steady, moving a little above or below the 410,000 acre figure. This is the acreage contracted by the Corporation for 1950.

These very plain facts do not do full justice to the British beet sugar industry. In addition to sugar, the crop provides tops for cattle feeding, and molasses and residual pulp are produced at the factories, the pulp also providing useful feed for cattle.

Now that animal feedingstuffs have been de-subsidised and have risen in price, the value of the crop and factory by-products is considerably enhanced, and this may be one reason for the reduction in the 1950/51 beet sugar subsidy. Slightly offsetting this factor, however, is the effect of de-subsidising fertilisers, for sugar beet is a heavily fertilised crop on most farms.

The proportion of our sugar needs met by the beet industry is approximately 25 per cent. This is possibly a misleadingly high figure; it should be realised that our total sugar consumption is well below pre-war quantity despite the growth of population. Were all our sugar needs met, the proportion that is home-produced would not be 25 per cent. unless the acreage and factory capacity were considerably increased.

It is sometimes supposed that beet sugar is a new development in the British diet, that before we developed our own beet farming and industry all our imported sugar was cane sugar. This is far from true. In 1913 four-fifths of our sugar came from beet, most of it imported from the already established and state-subsidised industries of Europe!

Malt Exports

Reports from Edinburgh indicate that a small quantity of malt has been exported to a Continental buyer and that several Continental countries are now seeking quotations. Pre-war Scottish overseas trade, which was largely based on the excellence of the product and the competitive prices quoted, was considerable.

The whole economic set-up has since swung against such exports, although the trade is in a position to supply and would welcome a recovery of these former markets. High freight charges and the whole burden of heavier costs at home make it extremely difficult for export firms to prosper, the general indication being that talks end immediately prices are quoted.

There is an obvious need to reach a price basis which foreign buyers will accept. The Government continues to make it extremely difficult to do this by maintaining all taxation and costs at the present very high level.

Rats—A State of War

The destruction of pests is high on the agenda for world food production. These islands are mercifully spared such scourges as locusts, which eat food, as well as those pests such as the tsetse fly and the anophelinae which play havoc with those who produce it. The fight is on, however, against the rat, and it is a grim one. Not so long ago, 18,000 rats were slaughtered in the sewers of a Midland city in one operation; in another town between 1,000 and 1,500 baits were laid one evening and by daylight the dead amounted to nearly 20,000. Official statistics show that in one treatment of the sewers of London—an operation lasting four days—one million rats were destroyed.

Young rats mature in three or four months, the gestation period being about three weeks and each litter averaging eight. With inefficient control it is easy to arrive at the stage when the effects of the control are balanced by breeding, and no further progress is made.

The fundamental research on which the methods are based has been carried out under the aegis of the Agricultural Research Council by the Bureau of Animal Population, University of Oxford; it is the Infestation Control Division of the Ministry of Agriculture and Fisheries which carries out most of the major operations, plotting and planning each one.

Side by side with these official measures, much can be done by individual effort—by insistence on drainage repairs, removal of junk, the hygienic disposal of garbage, and the immediate repair of structural defects which facilitate the entry of the vermin.

Lack of Hygiene in Fish Handling

Readers of a report recently published by the Ministry of Health will be taken aback by the remarks of Mr. J. D. Syme, Grimsby's chief port health inspector, on the lack of hygiene in fish handling. In the course of what amounts to a general condemnation of the conditions attached to the handling of fish for consumption, he tells of what he terms "the dismal story of contamination" at ports, which is in many cases continued up to the time the fish reaches the consumer.

Mr. Syme calls attention to the differences in procedure for inspection which may penalise one port as compared with another and suggests that efforts should be made to level the standard of inspection.

There is a necessity for a higher standard of examination of prospective food inspectors and a widening of the scope in training courses. The importance of the education of workers in industry, so strongly stressed at the Food and Nutrition Section of the recent Royal Sanitary Institute Congress at Eastbourne, is underlined by Mr. Syme, although he complains that attempts to persuade workers to use washing facilities have been "extremely disappointing."

He also finds that among the many first-class fish processing factories which have been built since the war, only in exceptional cases has there been any attempt by owners to educate employees in hygiene.

The quality of fish has deteriorated both during and since the war, and today the duties of the fish inspector are more onerous and his responsibilities greater than ever before.

"No other form of food inspection requires the inspector to make a decision in a matter of minutes—a decision which may involve the owners in a loss amounting to as much as £10,000 or £15,000."

This puts the inspector in a delicate position. Obviously in such cases, Mr. Syme points out, criticism can be bitter; but we feel that fish inspection should not be a matter of opinion, but should be based on sound scientific lines exercised by highly trained specialists.

Scottish Oatmeal Industry

Oatmeal millers in Scotland are to make strenuous efforts to maintain the cereal as a major item of food, and plans to this effect were announced at the annual conference held in Pitlochry recently. A number of sub-committees have for some time been studying various aspects of the production, preparation, and use of oatmeal, its relationship to other foods, and its role as a major food product in the national diet.

In pre-war years Scotland produced an average of 60,000 tons of oatmeal per annum; during the war the volume was expanded to about four times that amount, but by 1948 the competition of other foods, and the natural demand for a more varied diet, resulted in a declining demand. The fact that oatmeal is now a comparatively highly priced food—as compared with subsidised cereals and foods—has also had a serious effect in recent months. The decline in demand, in turn, forced upon the industry the need for a major survey of its present and future position. Already a considerable volume of useful work has been done. Investigations at St. Albans have provided new information about oats and their products; standards of quality have been established and millers are to be asked to adhere to these; the economic angle has been studied and it is intended to seek some parity with prices of other comparable foods. Raw materials, seeds, and processes are also being studied. Further, there is a strong possibility that a fusion between the two existing Scottish bodies will be achieved, and a national organisation covering Great Britain and Northern Ireland (and possibly including liaison with millers in Ireland) is mooted. These moves demonstrate the alertness of the oatmeal industry today and its determination to meet new conditions with energy and decision.

Centralising the Poultry Industry

Fresh outlets will soon have to be found to deal with Scotland's expanding poultry industry. The latest count showed over seven million birds and this is increasing steadily. So far there are relatively few plants at work for the mass handling of table birds, the policy having been rather to produce eggs and sell birds locally.

One recent development involves the collection of birds from a wide area and then processing in a centralised plant. This type of operation, common enough in North America, would appear to be certain of development in Scotland if present trends continue.

At present relatively little quick frozen chicken is marketed and prices are somewhat high by normal consumer standards. Centralised mechanised cleaning and cooking of birds and quick freezing on a basis which would permit low-priced distribution would be necessary to meet the present position. If this can be achieved, in spite of the many obstacles, the problem of the growing number of birds will be on the way to solution.

Pan Materials and Baking Quality

Hitherto, studies dealing with oven utensils made from different materials have focused attention more on the thermal efficiency of the pan rather than on the effects of the different pans upon the resultant baked product. Experiments by Helen Charley, of the Department of Foods and Nutrition, Oregon State College (*Food Research*, **15**, 2, 1950), have been carried out to test the theory that the baking pan, as well as the oven temperature, could influence the rate of heat penetration in batter baked therein and presumably would affect the quality of the baked product.

Using plain cake batter baked in pans made from steel, japanned iron, anodised aluminium, sheet iron, bright aluminium, tinned iron, stainless steel, copper, and glass, it was found that pans made from the first four metals were significantly faster baking pans than were those of bright aluminium, tinned iron, stainless steel, and copper. Thus, the faster baking metal pans were those which were dark or dull or both. The glass baking pan required a longer baking period than did a steel pan of the same size and shape.

The four more efficient metal pans produced cakes with significantly greater volumes than did the four less efficient ones. Cakes baked in the steel pan did not differ very much in volume from those baked in an oven-glass pan of the same size and shape.

A panel of judges rated the uncut cakes for appearance, and the crumb for eating quality. The shapes of the tops of cakes baked in three of the four less efficient metal pans were rated higher than those of the four faster ones, while the shapes of tops of cakes baked in the glass pan were rated above those baked in the steel pan.

For degree and evenness of browning, cakes baked in the bright aluminium, tinned iron, copper, and stainless steel pans were rated superior to those from the four faster baking metal ones, the judges rating the brownness of cakes baked in the steel pan superior to that of cakes baked in glass.

Cakes baked in the faster baking metal pans were found to be much better for overall crumb quality than those baked in the four slower baking metal ones. The quality of the crumb of cakes baked in the steel pan was rated higher than that of cakes baked in glass.

Thus, the more efficient metal pans produced cakes with larger volumes and better crumb quality than did the less efficient ones, but at some sacrifice in the appearance of the cakes. The steel pan, which was more efficient than a similar one made from glass, yielded cakes rated superior for crumb quality and for brownness of crust, but inferior in shape of top. There was no significant difference in the volumes of cakes baked in the glass and in the steel pans.

Cucumber Time

Summer is the time when cucumbers reappear in the shops, although an earlier British crop grown under glass comes with spring. A history of cucumbers comparable to Dr. Salaman's *magnum opus* on the potato has yet to be written.

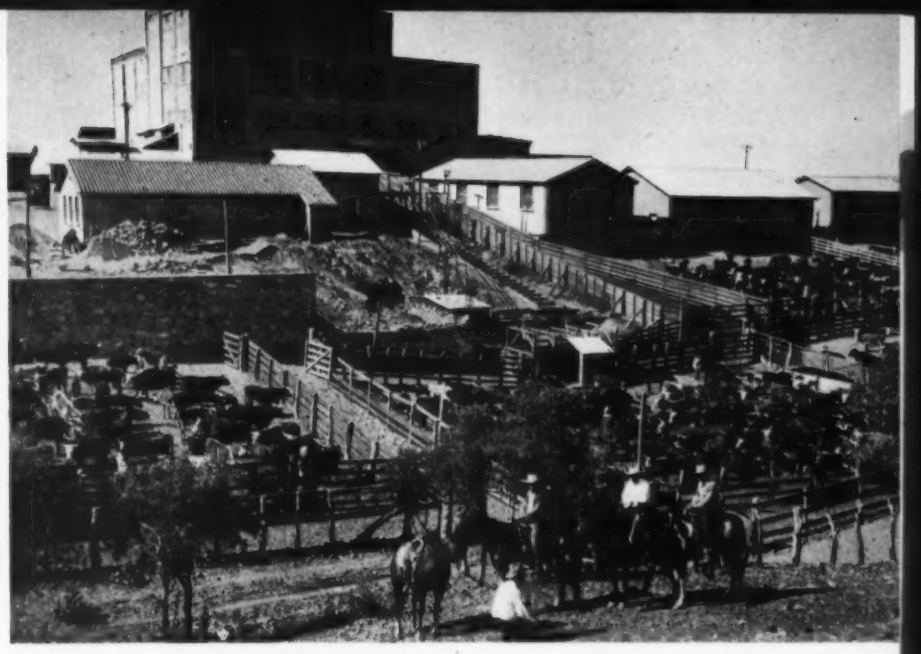
Our working classes ate them first as refreshers after a salty winter diet; then came an increase in social status for the cucumber, when the Stoke Newington gardener presented George I with two on New Year's Day, 1721.

The literary references are many, from Dickens's "Cowcumbers . . . three for tuppence" to Gay's and Scott's "cool as a cucumber." Then on from the "young maids cold as cucumbers" to such disparaging references as Barham's line on "that confounded cucumber I've ate and can't digest," and the early physician's dictum that cucumbers should be well sliced, dressed with pepper and vinegar, and then thrown away!

In contrast Sairey Gamp thought well of them: as witness that scene at table with plenty of Newcastle salmon, yet "I know's she wouldn't have a cowcumber!" cries Sairey, complainingly.

The columnist's talk of vitamins as "bottled sunshine" reminds us of Swift's sardonic tale of the man in Laputa who had the bright idea of extracting sunbeams out of cucumbers, sealing them in phials, and letting them out to warm the air in raw, inclement weather.

Nestling in the hills some fifty miles south of the United States border is the little mining town of Cananea, Mexico. Primarily noted for its mines, a new industry has grown up in the town —that of canning beef. The hills surrounding the town are dotted with the bold white faces, the squatty legs, the solid bodies that characterise Hereford cattle.



Exterior of the Productos de Cananea plant.

Canned Beef—Mexican Style

ROBERT M. RIDDELL, Jr.

IN the offices of the *Productos de Cananea, S.A. de C.V.*, sat Mr. C. E. Wiswall, Vice-President, whose meat canning plant is one of the most efficient and most modern in northern Mexico. Mr. Wiswall was talking.

"The future of the cattle growing business in Mexico is rather discouraging, because today we are closing down for the summer. The cattle need the additional benefits of summer rains and summer grass. In the past we would by now have had some indication of the new U.S. Government contracts; so far this year all we have is rumours."

On the killing floor the last of the cattle had been stunned and bled, and the dressing beds scrubbed and dried. Above, the single rail, beef-landing system, which is one of the latest of its kind in the country, the pulleys, and the splitting saw were made fast.

Dr. Francisco Martinez, representing the Mexican Department of Agriculture, and Dr. Garry Beach, representing the U.S. Department of Agriculture, had just made their final inspection in the refrigeration plant. A giant freezing room held row upon row of hanging beef which, because of its lower grade, is much redder than usually seen in America.

Down in the canning room the last shift is busy at work. One of the Mexican girls, Beda Lopez, who learned the art of her job quickly, stands at the point where the beef and the cans meet. Wearing rubber gloves, she checks the weight of the meat as it comes from the boning room to the meat grinder on its way to the final stage. Behind her, a conveyor brings cans to the steriliser.

Dressed meat in the cold store awaits inspection by the U.S. and Mexican Departments of Agriculture.

Meat from the grinder is fed into the truck on scale, the gravy is added, and the whole is emptied into the mixer.

Meat from the mixer reaches the can filling station where the operatives check-weigh the cans.

Beda Lopez checks every tenth can to test for accuracy.

Beneath the grinder, a large, square four-wheeled tub is being filled with 500 lb. of ground meat. To this is added 45 lb. of gravy, after which a large mixer gets to work and, after mixing, forces the meat and gravy through a filler into a waiting can. To ensure accuracy, girls check each can at the end of a conveyor belt, and adjust the weight of overfilled or underfilled cans on a scale that is set at exactly twenty ounces.

Beda also checks on the other girls, each of them putting in seven hours in one working shift. The need for cleanliness is impressed upon them, and the girls have respect for their job, and are alert and accurate. They are well paid for their work, and are proud of the product they help to produce.

In another room are the boilers that complete the last phase of the process. Three large steam cookers, each holding four steel perforated containers, with a capacity of 1,020 cans each, cook the mix for two and a half hours at a temperature of 240° F.

A group of Mexican cattlemen

met in Albuquerque, New Mexico, in 1947 to discuss the dreaded foot-and-mouth disease which was prevalent in the southern states, and the possibilities of world markets for the northern states' healthy cattle.

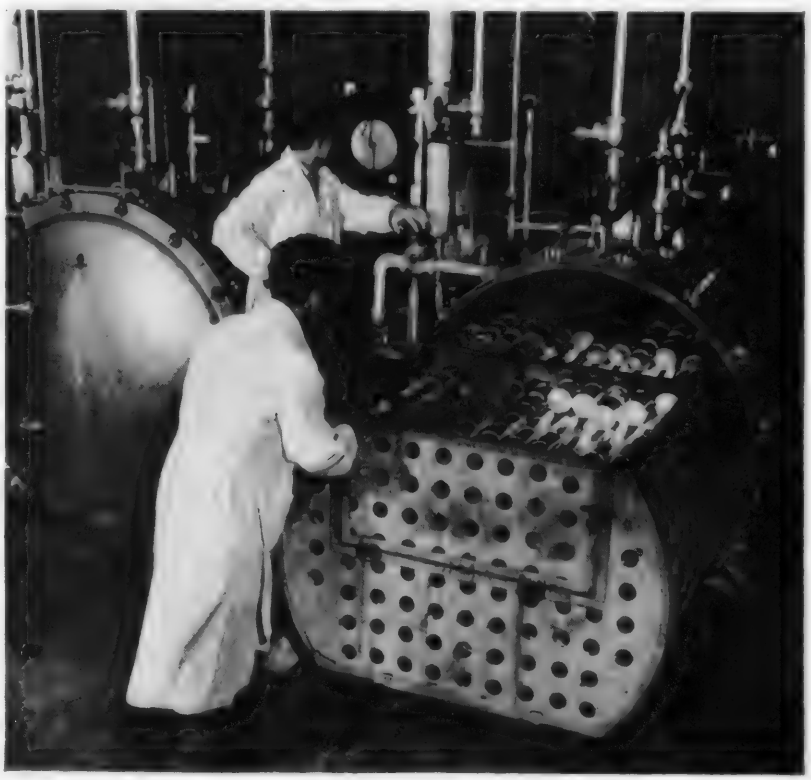
The matter of financing was also discussed at the meeting. A new, tremendous business was about to be born in Mexico. It was proposed that if the Mexican Government would do away with certain taxes to encourage building, the men holding the U.S. contracts would be financed and backed by the Import Bank of New York City through the *Nacional Financiera de Mexico*.

This new enterprise brought about an immediate relief to the cattle buyers. The market having stopped because of the quarantine, they could now get at least part of their money back by selling to these new canneries.

It did not take very long for the group to get the programme under way. From August 21, 1947, until March 5, 1949, the packing houses of northern Mexico slaughtered 615,391 head of cattle. This means that some 145,930,721 lb. of canned meat and gravy and 3,176,775 lb. of canned meat food products together with 2,525,110 lb. of liver spread have been delivered to the ports of Houston, Corpus Christi, and New Orleans for shipment to foreign markets.

Above: **The closing machine caps and vacuum seals the cans.**

Below: **Four containers, each holding 1,020 cans, are accommodated in each of the three large steam cookers.**



Birth of a New Industry

The plant at Cananea was responsible for 18,000,000 lb. of this meat. It is possible for the plant to increase this figure considerably, but the thirteen plants spread throughout Mexico must equalise the business.

According to Mr. Wiswall and others connected with the canning industry in Mexico, the U.S. quarantine regarding the shipment of Mexican cattle into the United States will never be lifted. Instead, there is seen the beginning of a new Mexican industry which will, in time to come, develop in size. The Mexican rancher who in the past raised cattle mostly for his own use is now increasing his herds by leaps and bounds in order to feed the ever-growing

canning plants. As he does this, he will do everything in his power to prevent foot-and-mouth disease, otherwise he will find that his income is cut and his prestige lost.

Following along in the wake of this new industry is the development of new roads and refrigeration. The Mexicans do not like refrigeration simply because they are not used to preserving their foods; what they like is lean, red, freshly killed meat.

The Mexicans have hitherto not paid much attention to road building, but the new canneries have incited them to become up to date. New roads are being laid each day, upon which will soon be travelling modern refrigerated trucks.

Assistance from America

The U.S. Government has greatly aided the cause by buying up the 151 million lb. of canned beef contracted for in Mexico, by sending trained men to supervise inoculations, and by providing huge quantities of serum to assist in the eradication of foot-and-mouth disease.

Mexico is prepared for her new adventure both mentally and physically. She has the trained men to aid in training others, but at present she cannot compete with other markets such as Argentina and Uruguay owing to the lack of transport and refrigeration facilities and of feed lots.

Although Mexico has modern equipment equal to any of that in the U.S., and is operating under the most rigid United States standards of sanitation, the cattle cannot be shipped to U.S. markets in the form of canned beef.

As the cannery was about to shut down its doors for the summer, Mr. Wiswall appeared to be hopeful. With all the money and aid from her northern neighbours, Mexico has the prospects of a great boom before her. It may take a little time, but the road ahead looks clear. In the very near future there will be more Beda Lopezes, more Mr. Wiswalls, more cattle, more beef and gravy, more wealth and prestige to the country south of the border, down Mexico way.

Planning a Dietary Survey

One of the earliest recommendations of the U.N. Food and Agriculture Organisation was to develop standardised methods for investigating food consumption so that accurate and comparable data might be available for all countries. A report* has now been published in the form of a handbook on the planning and conducting of dietary surveys.

The social and medical need for these surveys will not be disputed. At best national food "budgets" tell a scanty story of totals, of so much food and so many consumers; the real nutritional truth does not emerge until group surveys have shown how that food is distributed. Broadly, the survey is comparable with the sampling of opinions in Gallup polls. However, dietary surveys are not ends in themselves. They must not be looked upon as information collected and tabulated for its own sake, but as one step, and only one of several, in the task of providing better nutrition for populations.

A Tool of Research

In Britain and America the dietary survey has become a recognised tool of research, but in many countries, particularly in those where malnutrition is rife, it is still unknown. Even where a few surveys have been attempted, the conditions operating and the methods which have been used have been such that results cannot be internationally compared. The point is therefore emphasised strongly in this book that only a universal method or set of methods can make useful comparisons possible.

This point can, however, be questioned. There are many other country-by-country factors of variation besides food intakes and the assessed values of the food in terms of calories, proteins, etc. Food needs vary with climate and racial characteristics. The relationships between diet and health are not rigidly established and formulated all the way across the medical front. For example, we can well imagine that in many areas surveys would show that native populations are under-nourished, and there would be plenty of medical evidence to support this dietary conclusion; yet the same natives will possess teeth far superior to those which other populations use to chew their fuller diets!

It is not as if nutritional science was itself static and settled. A diet for children which did not contain milk might show up badly in a survey. Yet we have recently learnt from the Medical Research Council's report that in Germany children have been thriving excellently upon a "milk substitute" mainly of cereal origin.

Case against Standardisation

It would be wrong to marshal these few points into a case against standardised methods of dietary surveying; they do imply, nevertheless, that standardisation will not by itself provide a basis for direct and clear-cut comparisons.

It is not very noticeably stressed in this book that evidence from surveys will have to be "weighted" by considering many other factors of influence in making national comparisons.

There is, indeed, one factor which dietary surveys ignore to an alarming extent. It might be loosely called the factor of quality. If in a dozen portions of animal protein foodstuffs, all of which have been accurately evaluated in the laboratory for their nutritional offerings, one portion is tough and indigestible, another is evilly cooked, and another is off-flavoured from too long a past history, where is the truth of the laboratory verdicts?

Investigation of Cooking Methods

In this book it is stressed that cooking methods should be investigated in survey-making because of their influence upon such nutritional losses as vitamin oxidation or leaching, but little is said about the influence of cooking and preparation upon palatability and the actual desire to eat. Nor is quality a fixed relationship with cooking;

* *FAO Nutritional Study No. 4, 1949.* Prepared for FAO by Thelma Norris. Pp. 108. H.M.S.O., London. Price 7s.

it is variably related to group and individual tastes, instincts, and habits.

It is impossible to be wholly objective about food and diet, for eating is a subjective operation. Foods may be rationed with the best scientific intentions, but this does not mean that the food consumers can be rationalised.

If these limitations are borne in mind, this publication will undoubtedly serve a practical purpose, especially in those parts of the world which are politely described as "under-developed." For more developed countries the detailed accounts of family dietary surveying will probably be the most useful, and should be studied by food manufacturers who desire to employ this type of research in their own development plans.

Collation of Data

There are two main methods, the log-book method and the food-list method. The former imposes a considerable strain upon the housewife, who must keep records of all foods and amounts served at each meal; to reduce this strain, an investigator must call at frequent intervals during the period of the survey. It is therefore costly, although accurate in the final outcome if properly conducted.

The second method is based upon one interview during which an expert investigator establishes by the housewife's estimates approximately how much food of various kinds was consumed by the family at all meals during the week immediately preceding. This method is obviously easier but is open to errors.

Survey Forms

A substantial appendix gives samples of survey forms used in Great Britain and America. One Ministry of Food form intended for surveying the diet of schoolboys deserves unkind quotation. Question 6 reads: "I expect you have difficulties in getting food these days?" It is followed by dotted lines for the three possible answers —"yes," "no," and "don't know." Where is the British housewife who wouldn't know? If the answer is "yes" there is a further question: "What are the main difficulties?" The form designer might be commended for allowing the plural to enter this question but, with the typical obstinacy of forms, the space provided for the actual answer is so small that it would not leave room for even a singular difficulty to be recorded. FAO might have made one more recommendation—that dietary surveys should be conducted by independent institutes wholly dissociated from official departments whose major duties are concerned with diet provision and distribution.

(*Concluded at foot of next columns*)

Progress in Agricultural Research

AMERICAN publishers have always excelled in the boldly conceived "portmanteau" type of book, and the selection of agronomy* as a subject for this type of treatment is both timely and enterprising.

In his preface the chief editor observes that "many persons with widely different duties can properly call themselves agronomists. Not all these agronomists would agree as to the precise definition of the word agronomy. . . . The editors' definition of what constitutes agronomy is catholic; they will be guided in their choice more by what information may be of use to agronomists than by what constitutes agronomy." It is certainly odd that so uncertain a word should be preferred to the old, adequate, and well-understood "agricultural science."

The subjects discussed in this first volume comprise: Plant Growth on Saline and Alkaline Soils, New Fertilisers and Fertiliser Practices, Soya Beans, The Clay Minerals in Soils, Alfalfa Improvement, Soil Micro-organisms and Plant Roots, Weed Control, Boron in Soils and Crops, Potato Production, and Fixation of Soil Phosphorous. These have been chosen to fit a central theme of soil-crop relationships, and they represent specialised branches of agricultural technology in which there have been many advances in recent years.

Each section is a progress report. The writing is not too condensed. Space has been generously allowed for this rather difficult kind of literature to be adequately treated. One very helpful device, so often omitted from modern technical books, has been revived—a liberal "key" to the sub-section treatment is given at the beginning of each section.

It is a dangerous symptom of American science that far too many progress surveys are produced, a sizeable proportion of which are incomplete and unbalanced. Thanks to the efficiency of the U.S.D.A. as a publishing organisation, this has never been a serious feature of American agricultural science; and here, as in the notable U.S.D.A. Yearbooks, this excellent standard is maintained.

There is, however, the usual habit of ignoring contributions other countries have made to recent progress. To some extent this point of criticism has been anticipated and disarmed by the editorial preface, which states that "it is primarily North American agronomy that is reviewed" and promises that overseas contributions may be sought for future volumes. However, it is difficult to justify the absence of references to British developments with granulated fertilisers and combine-drill placement in the fertiliser progress section, and it is surely impossible to excuse the total absence of any reference to Dr. R. N. Salaman's work and name in the section dealing with potatoes.

British contributions to the development of modern selective weedkillers in the section on weed control are certainly mentioned, but they do not receive their due share of the progress spotlight. Despite these minor weaknesses, which are perhaps more noticeable to a British reviewer, this book is a magnificent contribution to the literature of current and fast-changing science.—D. P. H.

* *Advances in Agronomy* (Vol. I). Edited by A. G. Norman. Pp. 439+xii. Academic Press Inc., New York. Price £3.

Ministry of Food

LATEST STATUTORY INSTRUMENTS

The list given below is the continuation of the list of Instruments published in "Food Manufacture," May 1, 1950, page 196.

No.	*Date 1950*	
		PRICE FIXATION
424	Apr. 1.	The Feedingstuffs (Prices) Order, 1950. Revokes S.I. 1949, Nos. 500, 1160, 1388, 1963, and S.I. 1950, No. 195.
439	,, 1.	Order amending the Milk Powder (Maximum Prices) Order, 1947. Revokes S.I. 1949, No. 504.
474	,, 1.	Order amending the Oats (Control and Prices) (Great Britain) Order, 1948.
584	,, 8.	The Imported Canned Fish (Maximum Prices) Order, 1950. Revokes S.R. & O. 1947, No. 136; S.I. 1948, No. 152; and S.I. 1949, No. 1685.
554	,, 9.	The Milk (Great Britain) (General Licence No. 2) Order, 1950.
583	,, 9.	The Cheese (General Licence and Amendment No. 4) Order, 1950. Revokes S.I. 1950, No. 317.
560	,, 15.	The Fish (Returnable Containers) Order, 1950.
588	,, 23.	Order amending the Butter (Control and Maximum Prices) Order, 1947.
612	,, 23.	Order amending the Soap (Maximum Retail Prices) Order, 1947.
557	,, 30.	Order amending the Pulse (Control and Prices) Order, 1943.
617	May 7.	Order amending the Coffee (Maximum Retail Prices) Order, 1946. Revokes S.R. & O. 1947, No. 597; S.I. 1949, No. 1962.
		APPLES
441	Apr. 24.	Order amending the Home-grown Apples Order, 1949.
		BACON
618	Apr. 23.	Order amending the Bacon Rationing Order, 1949.
784	May 21.	The Bacon (Rationing) Order, 1950.
		BARLEY
442	Apr. 1.	Order amending the Barley (Great Britain) Order, 1949.
		CHOCOLATE, SUGAR CONFECTIONERY, AND COCOA PRODUCTS
766	May 15.	Order amending the Chocolate, Sugar Confectionery, and Cocoa Products Order, 1949.
		DREDGE CORN
443	Apr. 1.	Order amending the Dredge Corn (Great Britain) Order, 1949.
		DRIED FRUITS
473	Apr. 9.	Order amending the Dried Fruits Order, 1949.
		EGGS
709	May 8.	Order amending the Eggs (Great Britain) Order, 1949.
615	,, 18.	Order amending the Eggs (Great Britain) Order, 1949. Revokes S.I. 1949, No. 1938.
		FATS, CHEESE, AND TEA
640	Apr. 23.	Order amending the Fats, Cheese, and Tea (Rationing) Order, 1949.
		FEEDINGSTUFFS
440	Apr. 1.	Order amending the Feeedingstuffs (Licensing) Order, 1950.
642	May 1.	The Feedingstuffs (Rationing) (General Licence) Order, 1950.
		FISH
559	Apr. 16.	The Fish (Revocation of Controls) Order, 1950.
		FISH CAKES
589	Apr. 15.	The Food Standards (Fish Cakes) Order, 1950.
		FRUIT PULP
558	Apr. 5.	Order revoking the Fruit Pulp Order, 1948.
		INFANT MILK FOODS
487	Apr. 6.	Order revoking the Proprietary Infant Milk Foods Order, 1947.
		MILK
409	Mar. 26.	Order amending the Milk (Special Designation) (Pasteurised and Sterilised Milk) Regulations, 1949.
410	,, 26.	Order amending the Milk (Special Designation) (Raw Milk) Regulations, 1949.
555	Apr. 9.	The Use of Milk (Suspension of Restriction) Order, 1950.
		SHIPS' STORES
128	Feb. 1.	The Ships' Stores Order, 1950. Revokes S.R. & O. 1942, No. 2635.
		SHREDDED SUET
362	Mar. 18.	Order revoking the Shredded Suet Order, 1949.
		WHALE MEAT
189	Mar. 2.	Order amending the Food and Drugs (Whale Meat) Regulations, 1949.
198	,, 2.	Order amending the Food and Drugs (Whale Meat) (Scotland) Regulations, 1949.

The Determination of Moisture in Organic Substances

Part I

C. F. M. FRYD, B.Sc., A.R.C.S., A.R.I.C.

For the chemist, the days are past when he regarded the determination of moisture in organic materials as a mere matter of ovens and balances. Nowadays he recognises that it presents a first-class problem and one that is by no means solved. Choice of methods is an important item.

IT has been estimated that the daily consumption of food by the human race amounts to some three million tons; and since foodstuffs in general have as a component water varying in amount from a few parts per thousand to 90 per cent. or more, it cannot be argued that the determination of this water is any small matter.

For many generations mankind has exercised some form of control over the moisture content of comestibles, and the medieval ale-tester who sat in leathern breeches for a specified time on a beer-wetted bench was only one of a long line of primitive analysts engaged in ensuring that the over-wily trader did not sell too much water at the prevailing price for food and drink.

Development of Methods

The emphasis in such days was mainly if not entirely on moisture as it affects quality, either immediate quality, the fair-value-for-money angle, or—as primitive chemistry and biology developed—on keeping quality. The hay which was too damp when stacked brought its own retribution; the buyer of dried fish or flesh began to recognise that his purchase, if it was to sustain him in the lean winter, must be dried beyond a certain critical point; ergot and other fungal growths developed on over-moist rye and led more than once during the Middle Ages to epidemics of madness and even sudden death.

The causal connexions were at last realised and thus there were developed in the course of time some rough-and-ready criteria; an art of moisture estimation arose. To this day there remain trades and manufactures in which the crumple of a leaf between skilled fingers or the trickle of a crushed handful dropping back into the bin provides information on which the fate of a contract may depend. But the pressure of accountancy on the one hand, and the service offered by analytical chemistry on the other, have worked together to narrow the field of this empirical art.

The accountant, playing as he has done an increasing part in the development of the limited company, has demanded an increasing accuracy in the commodity account; and it hardly needs to be said that moisture content greatly affects not only the value but also the actual weight of the stock for which the accountant feels himself ultimately responsible. As for the chemist, the days are past when he regarded the determination of moisture in organic materials as a mere matter of ovens and balances; nowadays he recognises that it presents a first-class problem and one that is by no means solved.

What is Moisture?

When war-time shortage of shipping space focused attention on dehydration, there were not wanting cynics who enquired if the new process was markedly different from mere drying. Those who publicised the longer word no doubt felt that in order to draw attention to the specific virtues of the newer methods it was necessary to emphasise that many substances, normally regarded as dry, in fact contained water in large quantities. Bacon, for instance, which is described in many dictionaries as the flesh of pigs, cured, smoked, and dried, may contain in its leaner portions as much as 30 per cent. or more of water; and the desiccation of dried fruit is a process which obviously has not proceeded to the ultimate.

Yet (as those who experienced the less happy examples of dehydrated foodstuffs during the war will bear ready witness) the removal of overmuch moisture from

A resistance moisture meter for cereals. *Photo Marconi Instruments.*

Modifications of the original Dean and Stark apparatus.
Photo Quickfit and Quartz.

an organic material may fundamentally and permanently change its nature.

From observations of this type arose the conception of "bound water," the idea that the total water in certain materials is present in two forms, one of which ("free water") may be removed, or replaced, without serious change in the structure of the material; on the other hand, so it was argued, any attempt to remove the residual "bound water" resulted in irremediable damage to the molecular nature of the commodity.

Chemical Changes during Drying

Some at least of the evidence adduced in favour of this theory can equally well be explained as being due to certain chemical effects produced by the particular manner in which the final drying was performed. The "bound water" in such a case is more analogous to the water produced by the destructive distillation of cellulose or sugar than to any moisture present even as intramolecular water. Nevertheless it is true that some drying reactions are not reversible; the micelles of cellulose may be shortened, and certain proteins denatured by the mere abstraction of water, however carefully the process is carried out. In practice, the division between "free" and "bound" is difficult, if not impossible, to delineate.

Thus the question remains without a general answer; and the chemist has to submit for each organic commodity a definition of moisture which is in effect a definition of an agreed method for its determination. Occasionally a clause in an Act of Parliament or the statutory regulation of some approved authority makes the task of the analyst easier without necessarily making it more precise; but the majority of moisture determinations which are provided by chemists the world over represent compromise figures obtained by methods devised to provide, cheaply and easily, such information as will serve as *ad hoc* substitutes for the ideal "true moisture" figure.

The Line of Attack

It is a truism that the most important part of any moisture determination is done before the chemist sees his sample; but if, for the moment, consideration of the question of drawing a representative sample be deferred, there is presented as a first problem a critical decision. Which of the almost innumerable methods of moisture determination is the most appropriate for the given material? It may be convenient to outline in the briefest detail some of these many methods, postponing until later any close examination of their special virtues or disadvantages.

Analysis may be reduced to the crude separation of required components; distillation and direct measurement of the water content might conceivably be used as the basis for a method in certain cases; the entrainment methods of Dean and Stark[1] and their various modifications[2, 3] are, in fact, developments of such a process, in which the collection of the evaporated water is assisted, and the destructive distillation of the organic material minimised, by the presence of excess of a liquid immiscible with water, chemically inert, and having a boiling point little if any above 100° C. The water component, while in the vapour phase, may alternatively be removed by a stream of inert gas and conveyed to a drying tube containing an active desiccant,[4] or one immersed in, *e.g.*, solid carbon dioxide.[5]

The Use of Ovens

The various methods based on drying and on subsequent measurement of the loss in weight may be regarded as a logical (although by no means a chronological) development, not to say a simplification. In all such methods the assumption is made that water is the sole volatile constituent, and that the conditions of drying are such that no decomposition other than the separation of water from an unchanged residue takes place. If such assumptions in any given case are acceptable, considerations of speed and economics become important.

Methods of this type include the use of ovens, either with or without additionally heated forced ventilation; infra-red radiation; desiccant systems, either with or without reduced pressure; and as a late development the process known as lyophilisation,[6] in which freezing is used both to separate much of the water from a moist material, and also to present the substance to be dried in a rigid and porous form during the subsequent extraction by means of the maintenance of an extremely low vapour pressure.

Relative Humidity

The relative humidity of the micro-atmosphere in equilibrium with the sample forms the basis on which a further series of methods is built. The change in colour of certain crystalline systems[7] or the deliquescence of crystals[8] has been used to indicate critical points on

a scale of relative humidity, or the actual humidity may be determined directly by hygrometers[5] or by the absorption bands of water in the infra-red.[9]

Variations in the electrical resistance of a sensitive material immersed in the atmosphere have been made the means of determining its relative humidity; such an apparatus may, for instance, consist of a probe having a hollow chamber, the whole being thrust into the middle of a bale or stack. The moisture content of the sample material will already have reached equilibrium with the interstitial air, and this in turn will rapidly affect the substance (of an insoluble and porous nature, such as paper or a synthetic resin) within the probe, which possesses a high resistance with a marked moisture coefficient. Measurement of this resistance may be calibrated against samples of similar materials having known contents; and the apparatus has advantages of speed and mobility.

Direct and Indirect Methods

Other direct physical methods are based on the electrical properties of the sample itself. The capacity and the resistance of mixed systems consisting of cellulose, protein, sugar, and water, are obviously affected by the proportion of water, which has a much greater dielectric constant and, in the presence of small amounts of electrolytes, a much greater conductivity than the other components. Devices are on the market which enable one or both of these properties to be measured and correlated with moisture content. Both makers and users of such apparatus are aware of the complications likely to be introduced by the presence of variable amounts of electrolytes in solution or semi-solution, by inclusions of air, by differential packing, and the like.

Since chemists are responsible for the majority of moisture determinations, and since water enters stoichiometrically into a number of chemical reactions, it is perhaps surprising that purely chemical methods of determining moisture have proved to be of limited use, at least until the recent popularisation of the Karl Fischer technique.[10]

For certain special purposes advantage has been taken of the evolution of acetylene from calcium carbide,[11] of hydrogen from calcium hydride,[12] and of methane from methyl magnesium iodide.[13] Hydrochloric acid is liberated from α - naphthoxydichlorophosphine[14] and similar substances by water in the presence of certain aromatic solvents, and the hydrochloric acid vapour may be removed and titrated; similarly the hydrolysis of the acyl chlorides[15] and of some organic anhydrides has been used to give acid products. Sodamide[16] and magnesium nitride,[17] on the other hand, react with water to give ammonia. Nevertheless the Karl Fischer reaction remains almost the only method in anything like general use in which any attempt is made to titrate water or to determine it by any process which can strictly be termed chemical.

A number of indirect methods have been devised and have proved of great service for special applications. Obviously where a system is known to consist of two components only, a direct measurement of some physical characteristic may properly be correlated with the proportion which one component bears to the whole. Specific gravity, for instance, is a customary method of determining the relative proportions of an alcohol-water mixture, and viscosity and refractive index are other readily determined physical characteristics.

Even in cases where the mixture is not solely one of two components, physical indices may be used, either in combination as by the use of refractive index and specific gravity in the examination of sugar-alcohol-water mixtures, or by disregarding the effect of a minor component. For instance, it has been stated that the determination of the refractive index is one of the more reliable means of estimating the moisture content of jams; although jams are by no means wholly sugar-water mixtures, the error introduced by so considering them is frequently less than that involved in alternative methods of attempting to determine water content.

Addition of Miscible Liquid

Occasionally an attempt is made to reproduce artificially such two-component systems. A sample may be presented (such as a pectin solution, a kitchen waste, or the like) where the water content is high, and yet a small proportion of organic matter present is of such nature as to render some of the more rapid and economical methods of determining the mois-

An air-damped optical balance especially designed for the rapid weighing of hygroscopic samples. *Photo L. Oertling.*

ture content difficult or impossible. The addition, in such a case, of a known proportion of a miscible liquid (*e.g.* saturated calcium chloride solution, alcohol, etc.) having physical properties markedly different from the sample may, by the measurement of the extent of the change produced in those properties, enable a speedy estimation to be effected.

Some substances, such as calcium oxide or sulphuric acid, in reacting with water, produce heat. Where conditions exist in which that heat can be accurately measured, this effect has also been mentioned as providing a possible indirect method of dealing with the moisture content of difficult samples.[18]

So many and so diverse an aggregation of methods may well appear to make the selection for any given sample of a preferred technique a difficult, if not an impossible, task. An analyst would do wisely to decide precisely for what purpose the moisture figure is required. In many cases all that is really needed is an answer to the question, "Does this product contain moisture in excess of a certain threshold value?" Obviously this is the correct initial approach in nearly every instance of pure quality control. Bacteria or mould spores may survive in conditions of extreme desiccation, but they each have threshold values below which they neither propagate nor cause spoilage. Enzymatic degradation, too, is usually associated with moisture content in excess of some more or less definite figure. For immediate quality control, then, the actual method of moisture determination, and the relation of the figure obtained to any ideal "true moisture," is commonly of less importance than considerations of speed and cost. The answer "Dry" or "Not dry enough" is sufficient.

The matter is not quite so simple when the product has to be stored for some time and may during that period absorb further moisture from the air. Some idea of the rate of absorption may be available, or may be determinable by experiment; in such a case the keeping time of the product may readily be predicted if the threshold limit is known and the amount by which the existing moisture falls below it can be measured. For such conditions a "true moisture" figure is still not strictly necessary; the analyst would be satisfied if he obtained a repeatable moisture result with a linear relationship to the "true moisture."

A more difficult case is presented when strict stock-taking is needed of a product, perhaps of high value and one required to be stored for comparatively long periods. Tobacco, with a duty-paid value comparable with that of silver and a moisture content readily affected by the humidity of the air, is an example. Here the analyst may commonly be expected to obtain, on possibly some hundreds of samples every day, results which bear a very close relationship indeed to "true moisture"; for the figure actually needed is the "dry solids" weight of stock, on which as basis the gross weight of stock will rise or fall as the percentage of moisture varies. An approach to real accuracy, as well as repeatability and speed, is demanded here.

In all analyses of these three types, cost, especially the cost of professional or highly skilled time, is an important factor, and one which, if excessive, may rule out an otherwise promising method. Cost, however, is hardly of importance at all in those analyses concerned with pure or applied research, and it is for such purposes that some of the more refined and delicate methods have been devised. For each such determination many hundreds of moisture determinations of the more practical type are made and it may prove useful if further consideration is given to some of the more frequently used methods, their advantages, and the difficulties sometimes met in applying them.

(*To be continued*)

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Fish Preservation

ALTHOUGH the commercial freezing of fish dates from the nineteenth century, it is only in comparatively recent times that research has firmly established the basic principles of sound practice for freezing and cold storage.

The older methods, such as heavy salting, drying, and smoking, and the current method of chilling the fish with crushed ice have various disadvantages. In contrast with these, freezing and cold storage, properly applied, can preserve fish of all kinds, either fresh or lightly smoked, in first-rate condition for periods of up to nine months.

A recent booklet* discusses, in two sections, the factors affecting the quality of frozen fish, the influence of temperature and conditions of storage, the rate of freezing, the freshness of the raw material, and the conditions of thawing; cold storage of smoke-cured fish is considered separately.

The section on the application of freezing and cold storage deals with practical problems, raw material, freezing, "glazing" and wrapping, cold storage, thawing, and distribution.

A useful table is included which shows the storage life of "white" fish and herrings, and smoke-cured "white" fish and kippers at various temperatures of storage, in particular in the recommended range of $-5°$ to $-20°$ F.

* *Food Investigation Leaflet No. 11, "The Freezing and Cold Storage of Fish."* Pp. 20. Published for the D.S.I.R. by H.M.S.O. Price 6d., by post 7d.

Estimation of Vitamin E

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Because bioassays are slow and costly, vitamins are frequently assayed chemically where methods of satisfactory precision are available. This is true for vitamin E. Nevertheless the bioassay is still essential for establishing the vitamin values of derivatives, for investigating the effects of other substances on the biological efficacy of the vitamin, and for other research purposes. This review is an attempt to show the present status of chemical methods for estimating vitamin E, and how the problem of its chemical assay is complicated by the plurality of tocopherols having different activities, by the interference of other inactive compounds, and by the instability of tocopherols during the manipulations.

THE bioassay of vitamin E, as performed in most laboratories, is the same in principle and nearly the same in detail as it was in the pioneer experiments of Evans and Bishop (1923) and Evans and Burr (1927). It is based on the amount of the vitamin necessary for completion of pregnancy in 50 per cent. of the rats dosed with it. The chief of recent improvements in detail are those which have resulted from purification of the fats used in the diets. A useful review which covers the field very well has been written by Mason and Harris (1947).

Extraction of the Vitamin

The problem of extracting tocopherols from animal and vegetable tissues and from foodstuffs is generally similar to that of extracting vitamin A (including carotene), except that alkaline digestion is not suitable because tocopherols are more easily destroyed. Mechanical techniques developed for the one are often applied to the other. Prior to or during extraction of the vitamin into a fat solvent the material is usually macerated. This has often been done by grinding with sand or other abrasive, but now the use of the Waring blender and its imitators (Hines and Mattill, 1943) and dehydration by freezing (Quaife and Harris, 1948; Quaife and Dju, 1949) are becoming increasingly popular. The preliminary treatment sometimes includes saponification to remove fat and to hydrolyse esters of tocopherols. Before extracting vitamin E from blood the proteins may be precipitated with ethanol (Quaife and Harris, 1944) in the manner usual for vitamin A estimations.

Solvents Utilised

For the extraction of tocopherols the commonest solvents are ethanol (Emmerie and Engel, 1943; Quaife and Harris, 1948) and light petroleum (Binnington, 1942; Quaife and Harris, 1944). Hines and Mattill (1943) extracted muscle tissue with a mixture of these two solvents. Xylene was used instead of light petroleum by Quaife, Scrimshaw, and Lowry (1949) when working with small amounts (0·06 ml.) of blood because it is less volatile and therefore more accurate for micro methods.

The procedure used for purifying the extract will depend on the nature of the extract and to some extent on the type of colorimetric or other means used to determine the tocopherols. Most of the colorimetric methods consist in the oxidation of tocopherols, *i.e.* the reduction by tocopherols of an oxidising agent either to a coloured compound or to a colourless compound which is then coupled with another reagent to form a coloured one. Since the extraction will have been done with a fat solvent, the interfering substances are usually easily oxidisable fat-soluble compounds such as carotenoids, phenols, sterols, quinones, and pseudotocopherols.

Allowance for Interfering Substances

Other substances interfere by inhibiting or retarding the chemical reaction concerned with the formation of the coloured compound. One of the most generally used means for determining tocopherols in solution is that in which the colour given with ferric chloride and α-α'-dipyridyl is measured (Emmerie and Engel, 1938).

If the interfering substances are not removed they can sometimes be allowed for. Some workers (Karrer and Keller, 1939; Kjölhede, 1942) favoured estimation of the reducing power of the extract before and after acetylation. As tocopherol esters do not reduce ferric ions the difference is taken to represent total free tocopherols. Unfortunately the acetylation process also destroys the reducing activity of some of the interfering substances (*e.g.* carotenoids), which leads to spuriously high differences (Glavind, Heslet, and Prange, 1943). The reducing power of carotenoids can be allowed for if their concentration in the sample is also measured (Tosic and Moore, 1945; Quaife, Scrimshaw, and Lowry, 1949). Kaunitz and Beaver (1944) advocated the use of an internal standard to correct for the inhibiting action of fats on the reduction of ferric ions.

Separation of Interfering Substances

It is, however, better to remove interfering substances from the extracts than to correct for them. Many procedures have been proposed and several are in regular use.

Fats can be hydrolysed and removed by common saponification techniques, but unfortunately tocopherols are easily oxidised in alkaline solution. The use of nitrogen

gas (Baxter, Lehman, Hove, Quaife, Weisler, and Stern, 1947) and of pyrogallol (Tosic and Moore, 1945) has been advocated to prevent the destruction of the vitamin. A trick which does not appear to have been tried is that of using a lipase to hydrolyse esters and thereby avoid alkaline treatment.

Certain lipoids, especially those of plant origin, may interfere by reducing the ferric chloride of the Emmerie - Engel reagent. They react more slowly than tocopherols and their interference can be largely obviated by extracting the ferrous ions with water from the chloroformic reaction solution before appreciable lipoid reduction has occurred (Wall and Kelley, 1946).

Chromatographic Separation

Attempts at chromatographic separation have so far not been altogether satisfactory (Emmerie, 1949) because the several tocopherols are adsorbed with different affinities and several of the interfering substances come between them. Hence a very long column (at least of aluminium oxide) is required and the process is tedious. Tocopherols and most of the interfering substances are colourless, which makes collection of the separate fractions difficult.

Where the concentration is sufficient fluorescence might be of use for delineating zones, but so far spot tests have not been much developed. Nevertheless chromatography is so successful in analogous problems—as for instance in the purification of vitamin A and fraction control with spot tests by Gridgeman, Gibson, and Savage (1948)—that many efforts have been made to employ it. Various adsorbents have been tried. Aluminium oxide is one of the most popular and was used for example by Tosic and Moore (1945). Acid earth adsorbents which destroy carotenoids have been found useful by several workers. For instance, floridin activated with stannous chloride and hydrochloric acid (Kjölhede, 1942; Emmerie and Engel, 1939) has been extensively used. Wall and Kelley (1946) used magnesia to remove chlorophylls and carotenols, followed by sulphuric acid to destroy carotenes.

The procedure of shaking with 85 per cent. sulphuric acid to destroy carotenoids and other interfering substances was originated by Parker and McFarlane (1940). This method is not suitable for some extracts, especially those containing large amounts of cholesterol, with which sulphuric acid reacts to form a compound capable of reducing ferric iron (Devlin and Mattill, 1942).

Use of Hydrogenation

Hydrogenation, introduced by Quaife and Harris (1944), has proved successful for destructively removing carotenoids. More simplified kinds of apparatus for hydrogenation have since been devised by Quaife and Bichler (1945) and by Eden (unpublished). The extract is saturated with hydrogen at two atmospheres (Quaife and Bichler, 1945) in the presence of palladium chloride as catalyst adsorbed on calcium carbonate. Many fat-soluble unsaturated compounds are saturated by this treatment and thereby rendered inactive towards ferric chloride or chromogens. Under Quaife and Bichler's conditions hydrogenation does not affect tocopherols, so that they may be estimated by the usual colour reactions.

Phosphatides have been removed by salting out from an ether solution by cadmium sulphate (Mayer and Sobotka, 1942). Tocopherols may be freed from cholesterol by freezing out from ethanol (Eden, unpublished). In recent years molecular distillation has been used for eliminating some of the interfering substances (Dam, Glavind, Prange, and Ottesen, 1941; Quaife and Harris, 1946). The apparatus required for molecular distillation is complex and would generally be inconvenient for routine assays at present.

The Four Tocopherols

A most important advance in recent years in the chemical estimation of vitamin E has been the differentiation of several tocopherols. Up to the present four have been discovered—α, β, γ, δ—and these have different biological activities. α-Tocopherol has the highest biological value. It is usually accompanied by γ-tocopherol. The β form has been found only in wheat germ oil and is usually assumed to be absent from other materials. δ-Tocopherol was the last to be discovered (Stern, Robeson, Weisler, and Baxter, 1947), perhaps because its occurrence is relatively rare.

Separation of Tocopherols

Obviously an unqualified statement of total tocopherol concentration is only of limited use, since what is wanted is usually the vitamin E value or biological activity of the material. Moreover, different tocopherols react differently from one another in some methods. One solution to the problem is to perform bioassays, but these are much too long and laborious for most purposes. Another is to separate the various tocopherols, a feat whose difficulty has been discussed above. The tocopherols may be destroyed sequentially and the survivors determined systematically. A fourth solution is to use tests which are specific for each vitamer, an ideal difficult of attainment.

Tocopherols in Purified Extracts

For some purposes it may be sufficient to estimate the total tocopherol content of the extract, and indeed until recently this is what was always done. This is satisfactory, for instance, for blood which contains predominantly α-tocopherol. Methods estimating total tocopherols usually employ mild or vigorous oxidation of the tocopherols.

Among the mild oxidation methods the one devised by Emmerie and Engel (1938), in spite of certain disadvantages, is still one of the most frequently used. In this method ethanolic solutions of ferric chloride and of α-α'-dipyridyl are added to the extract; tocopherols reduce the ferric to ferrous ions and these react with the dipyridyl to produce a red colour which is measured. Ferric chloride in ethanol is slowly re-

duced in bright light even in the absence of tocopherols. However, this may be prevented by storing and using the solutions only in dim light. Ferric chloride, though reduced by free tocopherols, is not reduced by esters, which therefore fail to give the Emmerie-Engel red colour. Esters are, however, rarely found in nature, but if the extract does contain esters, as in pharmaceutical preparations, preliminary saponification is necessary.

Glacial Acetic Acid as Solvent

Devlin and Mattill (1942) proposed the use of glacial acetic acid as solvent instead of ethanol because both ferric chloride and dipyridyl can be prepared in one solution, which saves manipulations during the assays. Stern and Baxter (1947), however, considered this advantage to be outweighed by the disadvantages that the colour produced is not a linear function of the concentration of tocopherol and that the time for development of the maximum colour differs for different tocopherols.

Mild and Vigorous Oxidation

Vinet and Meunier (1941) measured the blue colour of ferrous ferricyanide produced by the reaction between tocopherol and ferric ferricyanide. Another principle is based on an auric chloride titration and was proposed by Karrer, Escher, Fritzsche, Keller, Ringier, and Salomon (1938). This method was later modified by Smith, Kolthoff, and Spillane (1942), who used the dropping mercury electrode as indicator. Other methods of mild oxidation have been discussed by Baxter *et al.* (1947).

Furter and Meyer (1939) employed a relatively vigorous oxidation. They treated extracts with nitric acid and determined colorimetrically the red orthoquinones produced. Binnington and Andrews (1941) purified these on alumina. Chipault, Lundburg, and Burr (1945) reacted the purified orthoquinones with leucomethylene blue and measured the blue produced. This last step made the method sensitive enough for the estimation of the low concentrations of tocopherols in hog fat. Another modification of Furter and Meyer's method was made by Kofler (1942), who treated tocopherol with nitric acid followed by orthophenylenediamine, purified the derivatives on alumina and determined the product fluorimetrically.

Tocopherols, when present in high concentration as in pharmaceutical preparations, may be estimated by the spectral absorption at 294 mμ, but this method does not appear to be much used because several other substances interfere (Morton, 1942).

Distinguishing between Tocopherols

So far we have considered tocopherols unspecifically. However, several procedures have been proposed for distinguishing between at least some of the four known tocopherols and estimating them separately. Hove and Hove (1944) found that γ-tocopherol produced less colour than α-tocopherol with the dipyridyl reagent provided the reaction proceeded at low temperature, and used this fact as the principle of a method for distinguishing between them. Stern and Baxter (1947) have also used the Emmerie-Engel technique for estimating total tocopherols empirically by determining the red colour at exactly 2·5 minutes after mixing. At this time the colour produced by δ-tocopherol, although still increasing, is equivalent to the maximum colour given by the other tocopherols. This is a compromise, but some authors do not even mention the difficulty of differential colour maxima with time.

Selection of Reaction Times

Vigorous oxidation methods can also be so applied as to distinguish between tocopherols. Advantage is taken of the fact that γ-tocopherol is much more easily oxidised than α-tocopherol. By carefully selecting the reaction time most of the former will be oxidised when only a few per cent. of the latter has been affected. For instance, Baxter, Robeson, Taylor, and Lehman (1943) used silver nitrate as oxidising agent in 99 per cent. aqueous methanol. Fisher (1945) used a mixture of nitric acid, glacial acetic acid, and chloroform, whereas Taylor and Rawlings (quoted by Baxter *et al.*, 1947) found ammonium nitrate in glacial acetic acid was satisfactory. For these three methods β-tocopherol was assumed absent and at the time the methods were published δ-tocopherol had not been discovered.

Diazotisation

Diazotisation is proving useful in the estimation of individual tocopherols. Weisler, Robeson, and Baxter (1947) coupled tocopherols with dianisidine, and found that in sodium carbonate solution the compound formed with γ-tocopherol absorbs more light than the corresponding δ derivative, whereas in potassium hydroxide solution this relationship is reversed. A further advance in the distinction between tocopherols was published by Quaife (1948). The red nitroso compounds of β-, γ-, and δ-tocopherols formed by treatment with sodium nitrite and acetic acid were separated on a chromatographic column of zinc carbonate and determined colorimetrically. In both these methods α-tocopherol is inert, and was determined as the difference between the sum of the other individuals and the total found by the Emmerie-Engel or other method. This procedure is not wholly satisfactory, because in determinations by difference the errors may be cumulative and α-tocopherol, which is biologically the most important member, is the one which bears this error.

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TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

The Prevention of River Pollution

THE recommendations of the River Pollution Prevention Sub-Committee of the Central Advisory Water Committee* mark a further stage in the steps proposed for safeguarding and improving the condition of rivers in England and Wales. The new River Boards, which are now being set up under the River Boards Act, 1948, will provide a new administrative organisation based on natural catchment areas instead of local government areas. The next stage is to equip River Boards with up-to-date and effective legal powers.

The sub-committee consider that the Rivers Pollution Prevention Act, 1876, which is the principal Act now in force, needs considerable revision and strengthening. One of their main recommendations is that effluents discharging into a river or stream should be required to comply with standards prescribed by the River Boards. The standards would be prescribed by by-laws, subject to confirmation by the Minister of Health under a procedure which would give interests affected an opportunity to raise objections and to be heard in support of them. Such standards would vary according to conditions in each river.

Under the 1876 Act legal proceedings in respect of pollution by trade and mining wastes may be taken only with the consent of the Minister of Health. The sub-committee recommend that once standards have been prescribed consent should not be necessary in the case of failure to comply with a standard, since the effect of the standard on industrial interests will have been considered when the standard was applied. They recommend, however, that the Minister's consent should still be required where no appropriate standard has been prescribed.

It is also recommended that River Boards should have power to control new openings for the discharge of effluents into rivers or streams and that they should be given notice of proposed changes in existing discharges.

The sub-committee consider it impracticable to extend control automatically to all tidal waters at present, and recommend that the existing procedure whereby an order of the Minister of Health is required should be continued, but that the making of such an order should not depend solely on "sanitary grounds" as at present. Other recommendations deal with the deposit of solid matter in rivers, legal proceedings, and supplementary powers.

* *Prevention of River Pollution.* Pp. 76. H.M. Stationery Office. Price 1s. 6d. net, post free 1s. 8d.

Food Research Progress

THE origin and growth of food research in Great Britain under the Department of Scientific and Industrial Research were outlined in a paper presented by Dr. Franklin Kidd, F.R.S., Director of Food Investigation, before the Royal Society, on May 18. He described the organisation, character, and objectives of the work undertaken at the main research stations coming under the Directorate of Food Investigation. He also touched upon the setting of this development in relation to other developments in food research during the last thirty years, and its present position.

The object of the Board is to carry out research to provide information on the basis of which raw foodstuffs can be handled, stored, distributed, and processed so as to provide the consumer with a great variety of foods of better quality and reasonable price. The chief aim is to promote the practical application of discovery.

It has always been the policy of the Department of Scientific and Industrial Research, said Dr. Kidd, to encourage secondary industry to carry out its own research, and the formation of other associations has obviously reduced the field which was in the first place allotted to the F.I.B. The Board has devoted approximately half its resources to work of a long-range character. It has not been its function to deal with nutritional requirements, etc., but only with the nutritional value of foods and their preservation.

The Pasteurisation of Liquid Egg

The well-known egg packing firm of Gracey Brothers have pioneered many developments in egg marketing, and during the last four years they have been actively concerned with the production of the best possible quality of liquid from cracked eggs. They found that while improved breaking technique and increased attention to sanitation with frequent sterilisation of equipment helped, they were still unable to satisfy their chemist and the Research Section of the Northern Ireland Ministry of Agriculture. It seemed that pasteurisation, if this were possible, might be the only satisfactory answer, and reports from the U.S.A. and advice from Dr. Brooks of the Cambridge Low Temperature Research Station confirmed this. This article describes the way the method is being carried out.

ALTHOUGH bacterial infection of the developing ovum in the oviduct of the hen has been known to occur, it is generally accepted that the contents of about 95 in every 100 eggs are sterile on laying. Most of the decomposition which takes place during the handling of shell eggs is caused by the invasion of their contents by bacteria and moulds through the pores of the shell after laying. There exists within the white of the egg a natural defensive mechanism against micro-organisms, but it cannot cope with an invasion by large numbers, such as occurs when the shell is both dirty and moist.

Bacteria in Whole Egg Liquid

Many types of bacteria multiply rapidly in whole egg liquid when the temperature of the liquid is higher than about 45° F. In the preparation of frozen egg there is, therefore, a rapid and continuous increase in the number of bacteria from the time the egg is broken until the time when bacterial multiplication is greatly reduced by lowering the temperature of the liquid below 45° F.

The primary source of infection is the bacteria which are present on the surface of the shell of all eggs, but in commercial operation there are invariably numerous subsidiary sources of infection, *e.g.* breaking utensils, piping, pumps, filters, and such containers as liquid pails, churns, and mixing and holding tanks.

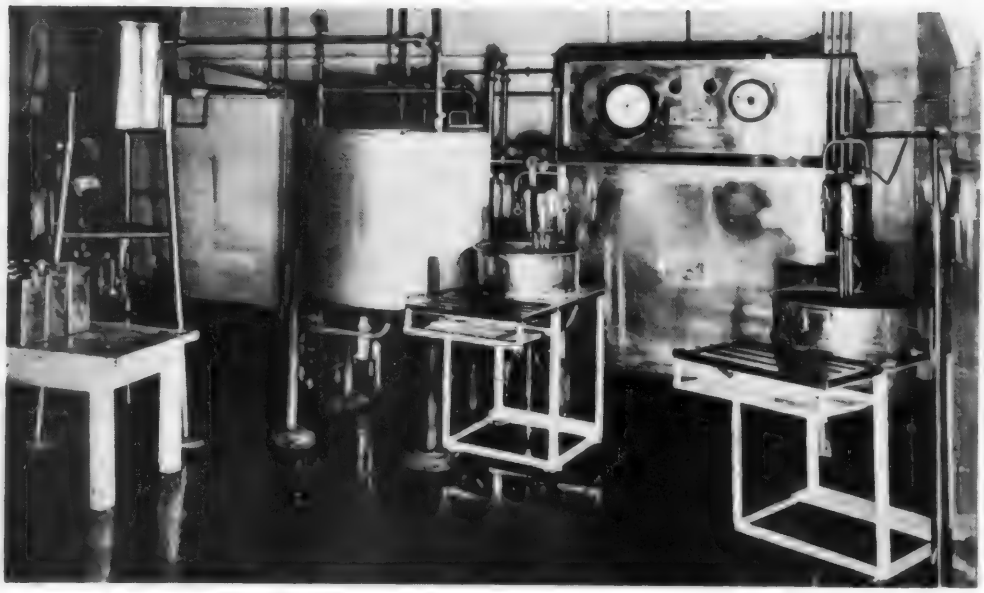
The predominating organisms in liquid egg are enterococci, but usually the product also contains coliform bacteria; numbers ranging from 300 to 30,000 per gram (average number 6,000) have been reported in commercial frozen whole egg. The presence of *E. coli* has long been recognised as an indication of faecal contamination. Small numbers of pathogens may also be present, consisting mainly of various species of Salmonella and, to a lesser extent, of coagulase - positive staphylococci.

Recent work indicates that Salmonella in hens' eggs is usually derived from the external shell surface and that dirty eggs contaminated with faeces are the chief offenders. It is not certain, however, that faecal contamination is the sole cause; Salmonella-infected flocks are not unknown and yolk infection in the oviduct of the hen may occur occasionally.

The available evidence indicates that the number of Salmonella organisms usually present in frozen egg is too small to present any hazard to health if the product is properly used. Danger arises when bacterial multiplication is allowed to occur in affected samples of thawed egg liquid, *e.g.* during long standing at ordinary or elevated temperatures before use, and when such samples are eaten without thorough cooking.

By strict attention to sanitation it is possible to minimise infection and bacterial multiplication, but

Each egg is carefully examined before being added to the bulk, any traces of albumen being removed by suction. This process is shortly to be replaced by an improved one.



A view of the plant showing the 200 gallon raw egg storage tank, control panel, pasteurised egg tank (*left*) with overflow leading back into the raw egg tank, bowls for freshly broken egg, and mixing apparatus. After mixing, the egg is filtered, then passed into the raw egg tank.

even in well-managed plants engaged in breaking fresh spring eggs the average total viable bacterial count of liquid before freezing is often more than one million per gram. When eggs are broken under unsatisfactory conditions, especially if the eggs are dirty, cracked, or leaking, very high counts may be obtained, *e.g.* over ten million per gram.

Utilisation of Cracked Eggs

The manufacture of liquid from cracked eggs is a comparatively new operation in Northern Ireland. The usual pre-war custom was for these eggs to be sold by retail, but this was stopped when the Egg Control Scheme came into operation in 1941.

Bakeries then received allocations of cracked eggs in shell based on pre-war usage and any surplus was directed to the NAAFI. It is only since the NAAFI demand ceased in 1945 that the sole outlet for surplus cracked eggs has been conversion into the liquid form.

Effect of Heat on Egg Liquid

According to a report by Dr. Brooks, while until recently it was generally believed that if egg liquid were heated to a sufficient temperature for a sufficient time to kill bacteria, coagulation would take place, later work had shown that it could be heated to 140° F. or more without coagulation, and that efficient pasteurisation could be achieved. It is true that the heat coagulation of the liquid sets an upper limit to the pasteurising temperatures that can safely be used, but such temperatures are somewhat lower than those commonly employed in the pasteurisation of milk either by the batch or the high-temperature short-time method.

The amount of coagulation which occurs when egg liquid is heated depends on the temperature attained and the length of time the liquid is kept at that temperature. At and above about 163° F. coagulation is almost instantaneous. The practical temperature range for the pasteurisation of egg liquid has been found to be from 140° to 145° F., the exact temperature used being largely determined by the type of equipment employed.

Encouraged by Dr. Brooks's report, Graceys have now in successful operation the first commercial installation in Europe for the continuous pasteurisation of liquid egg.

Operation of the Plant

The plant consists of the APV plate type heat exchanger complete with ancillary equipment and the necessary holding tubes in an insulated panel surmounted by the instruments that control the process.

The egg liquid is drawn from a float control balance tank fed by gravity after mixing, and pumped through the heat exchanger, where it is first heated to approximately 122° F. by means of regeneration and, further, to 142° F. by means of hot water circulation at a controlled temperature of 144° F.

After heating, the egg liquid is passed into the holding tubes, where it is held for a minimum period of three minutes, after which it re-enters the heat exchanger to be cooled to 38° F. by means of regeneration and chilled water. The hot water temperature is regulated by a non-indicating temperature controller, the steam diaphragm valve being operated by air pressure and designed to close with air failure.

To control the pasteurising temperature, a recording thermometer bulb is placed in the egg circuit at the end of the holding tube, and if this temperature drops below 140° F., an electrical contact is made whereby the automatic flow diversion valve is brought back into operation and diverts the improperly heated liquid back to the balance tank for recirculation.

On pasteurising temperature being regained, an electrical delay system is brought into action which does not allow the liquid to be placed on forward flow for a further forty-five seconds; this safety arrangement is introduced to ensure that all the unpasteurised egg is passed back to the balance tank for reprocessing.

When the automatic diversion

of improperly treated egg takes place, an indicating warning bell and red light are brought into the electrical circuit and the bell having been switched to the "off" position, will ring again after the delay has operated to indicate that the egg is now ready for forward flow and must be switched off into the running position. The red warning light will go out when the bell rings after pasteurising temperature is reached.

Should the egg temperature rise above 144° F. a warning buzzer comes into operation and breaks the air circuit, so causing the steam supply to the hot water circuit to be shut off as if by air failure. The buzzer, if switched off, will come into operation again when the temperature drops below 144° F. and, therefore, on being switched off again, leaves the plant in the running position.

Plant Modifications

Only two major alterations were found to be necessary in the plant as originally supplied. The flow controller proved to be too delicate in operation with the viscous egg product and the particles of chalaza which had passed the screens; this has now been replaced with a simple control cock, and modified plates have been fitted in the heat exchanger to give a longer period of continuous running.

Bacteriological Tests

The bacteriological tests made by the Northern Ireland Ministry of Agriculture are of a preliminary nature and indicate the bacterial quality achieved during the first six weeks' operation of the plant. It is intended to check the quality of the liquid egg at regular intervals throughout the complete processing period. The analyses given include the bacteriological quality of the raw liquid egg and that of the same product after holding at 142° F. for three minutes. Figures giving the estimated percentage kill of organisms present in the raw article as a result of the heat-treatment process are also included in the table.

Samples of liquid egg for bacteriological analyses were taken twice weekly during the initial stages of the plant operation. Four sampling points were selected as follows:

(i) Entry to raw egg pump.
(ii) Entry to holding section, subsequent to pre-heating.
(iii) Subsequent to holding and regenerative cooling.
(iv) From can filling tap.

Each sampling point was thoroughly sterilised with alcohol prior to sampling, and to obtain representative samples the egg was allowed to flow for several seconds from the point before the actual sample was taken. From a knowledge of the plant timing it was possible to arrange sampling to ensure that a similar batch of egg was being sampled at each successive point.

Samples were drawn into sterile glass bottles and tested in the laboratory within one hour of taking. At the laboratory, 10 grams of the sample were weighed into sterile weighing bottles, 90 ml. 0·9 per cent. saline added, and the appropriate saline dilutions prepared in the normal way. Plate counts were estimated on 1 per cent. milk agar at incubating temperatures of 22° C. and 30° C. and coliform growth in McConkey's broth at 37° C.

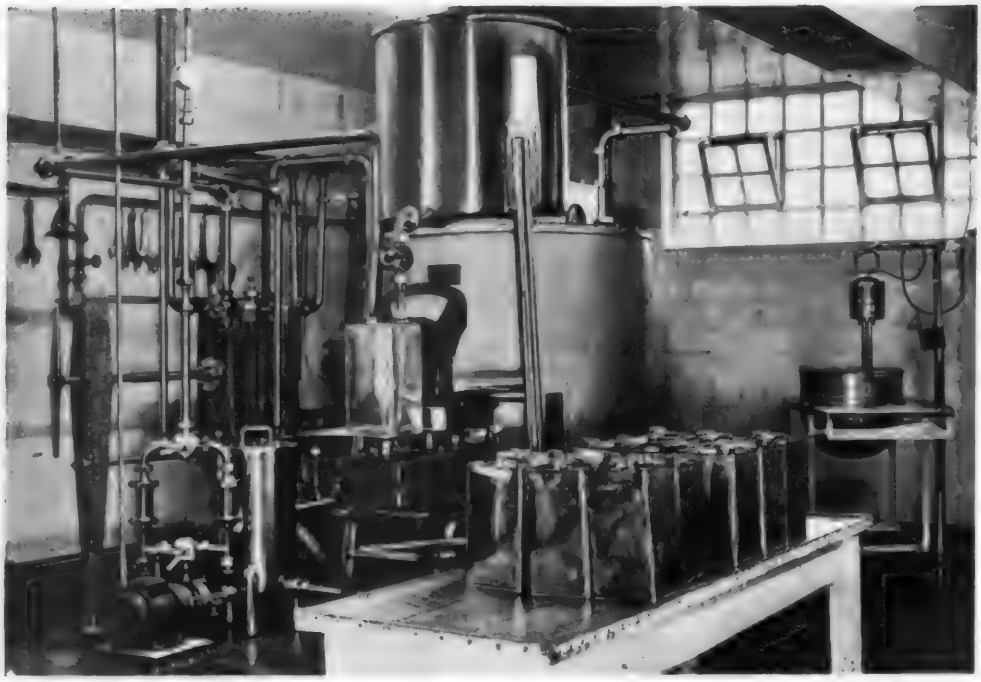
Typical results of the bacteriological analyses carried out from February 25 to April 4 are given in the Table, together with the percentage kill of organisms as estimated from plate counts at 22° C. and 30° C. accruing as a result of the heat-treatment process.

As the results in the Table show, a feature of the heat-treatment process proved to be the high lethal rate obtaining for organisms existing in the raw liquid egg, thereby producing a product of excellent hygienic quality, in so far as viable micro-organisms are concerned. To a great extent the same is true for coliform types found in the raw egg, but informa-

BACTERIOLOGICAL ANALYSES OF RAW AND HEAT-TREATED LIQUID EGG

Date of Sampling	*Sample No.*	*Sampling Point**	*Bacterial Count per Gram. at* 22°C.	30°C.	*Coliform Organisms at 37°C. Present in* 1 g.	1 10g.	1 100g.	1 1,000g.	*Percentage Kill of Organisms at* 22°C.	30°C.
25.2.50	1	(i)	Over 500,000	Over 500,000	+	+	+	+		
,,	2	(ii)	44,000	19,000	–	–	–	–		
,,	3	(iii)	7,800	3,200	–	–	–	–		
,,	4	(iv)	5,300	2,600	–	–	–	–	—	—
27.2.50	5	(i)	5,700,000	6,200,000	+	+	+	–		
,,	6	(ii)	16,300	16,100	–	–	–	–		
,,	7	(iii)	2,200	1,900	–	–	–	–		
,,	8	(iv)	2,200	2,300	–	–	–	–	99·96	99·97
21.3.50	29	(i)	10,300,000	9,500,000	+	+	+	+		
,,	30	(ii)	31,000	30,000	+	+	–	–		
,,	31	(iii)	8,100	7,500	+	–	–	–		
,,	32	(iv)	6,100	6,300	+	–	–	–	99·92	99·21
23.3.50	33	(i)	5,800,000	4,200,000	+	+	+	+		
,,	34	(ii)	45,000	44,000	+	+	+	–		
,,	35	(iii)	8,700	13,200	–	–	–	–		
,,	36	(iv)	6,300	8,400	–	–	–	–	99·85	99·69
28.3.50	37	(i)	6,100,000	7,800,000	+	+	+	+		
,,	38	(ii)	13,000	8,000	+	+	+	+		
,,	39	(iii)	4,600	4,200	+	+	–	–		
,,	40	(iv)	5,800	5,900	+	+	–	–	99·25	99·94
30.3.50	41	(i)	89,600,000	39,700,000	+	+	+	+		
,,	42	(ii)	608,000	506,000	+	–	–	–		
,,	43	(iii)	51,000	43,000	–	–	–	–		
,,	44	(iv)	58,000	53,000	–	–	–	–	99·94	99·89
4.4.50	45	(i)	1,700,000	4,800,000	+	+	+	+		
,,	46	(ii)	146,000	144,000	+	+	+	–		
,,	47	(iii)	13,100	10,700	+	+	–	–		
,,	48	(iv)	14,600	11,700	+	+	–	–	99·23	99·78

* (i) Entry to raw egg pump.
(ii) Entry to holding section, subsequent to pre-heating.
(iii) Subsequent to holding and regenerative cooling.
(iv) Can filling tap.



In another part of the plant is the filling arrangement tank for raw and pasteurised egg, heat exchanger, and corner of the control panel in the background. The parallel filter screens above the egg pump allow screens to be renewed and cleaned without interrupting the running of the plant.

tion obtained to date appears to indicate that the margin of safety for the destruction of coliform organisms at a temperature of 142° F. for three minutes is a somewhat slender one. This fact is evidenced by the results obtained on sampling days March 21, 1950, March 28, 1950, and April 4, 1950, where it was known that the normal throughput of the plant of 75 gallons per hour was inadvertently increased to a figure nearer 90 gallons per hour.

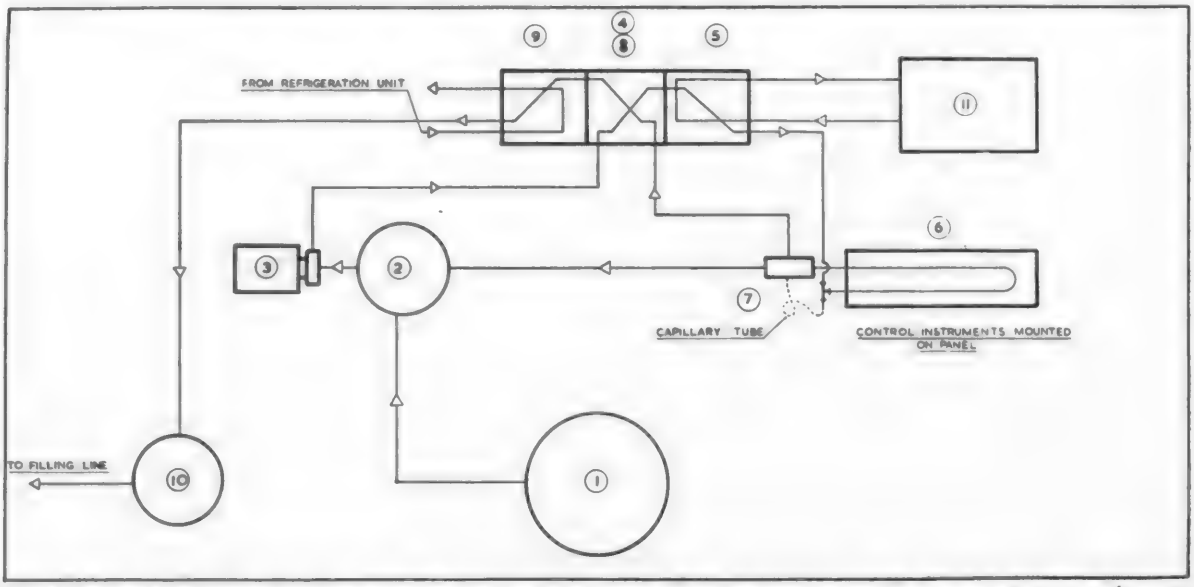
The pasteurisation plant is thus the means of producing from cracked eggs liquid which is of as high a standard as could be produced under the most careful conditions from first quality new laid, sound shelled, clean eggs.

Baking Tests

Heat did not have any injurious effects on the whipping qualities of the egg; indeed Scribbans Kemp (Northern Ireland), who carried out baking tests, have found that the pasteurised egg has a slight advantage, but this they believe may be due to the more complete emulsification and more careful filtering.

ACKNOWLEDGMENT is made to the Department of Scientific and Industrial Research, Food Investigation Organisation, for permission to use material from an unpublished report (Low Temperature Research Station Record Memorandum No. 233).

Also to the Bacteriology Division of the Northern Ireland Ministry of Agriculture for technical advice and assistance over an extended period and for services in carrying out bacteriological tests.



Flow diagram of liquid egg pasteurising plant. 1. Raw egg storage tank. 2. Float balance tank. 3. Raw egg pump. 4. Regenerative heating in Paraflow. 5. Heating section. 6. Holding tubes and panel. 7. Flow diversion valve. 8. Regenerative cooling. 9. Chilling section. 10. Pasteurised egg storage tank. 11. Hot water heating unit.

Long Ashton's Cider Sampling Day

THE annual Cider Sampling Day at the Research Station, Long Ashton, on May 4 was well attended by cider makers, farmers, fruit growers, and others for whom this day has a special interest.

Twenty-five ciders were sampled during the morning session and three important aspects of cider-making were illustrated: (1) the importance of the raw material, *i.e.* the apple (Group I), (2) the nature of the yeast used to bring about the fermentation (Group II), and (3) the effect of a preliminary treatment of the juice prior to its fermentation (Group III). In the making of the ciders of Groups I and II, fermentation was checked at a specific gravity of approximately 1·025 so that some natural sugar was retained. The ciders were then "naturally conditioned" in bottle.

Single-variety Ciders

The ciders in Group I were mainly single-variety ciders, *i.e.* each was made from the juice of apples of a single variety so that the vintage quality of the varieties could be assessed. The varieties chosen were mostly those now officially recommended for planting, although varieties not on the recommended list but which are of special interest were also included. In this group were examples of the four main classes of ciders, namely Sharp, Bittersharp, Sweet, and Bittersweet. These single-variety ciders did not contain the three main constituents acid, tannin, and sugar in the proportions required in a finished cider. Blends of these individual ciders, in which the constituents were in suitably balanced proportions, were therefore included.

In the above group, fermentation was brought about by the yeasts naturally present in the juice. In contrast, the ciders in Group II were made by the method of "dominant fermentation" in which a single selected yeast was used for each cider—a method which is extensively practised in Switzerland. Two of the yeasts had been isolated from a fermenting juice (variety Kingston Black). The other three were wine yeasts—one was a champagne yeast and the other two Fendant and Herrli-

Demonstration of apple tree spraying.

berg—which originally emanated from Switzerland, where they are used extensively for cider-making. The "selected yeast ciders" in general were judged to be superior to the control, and the cider made by the champagne yeast was particularly well liked. This method of cider-making would appear to merit further attention.

Maceration and Defecation

In the third group were ciders made from juice which had received special treatment, maceration and/or defecation prior to fermentation.

The object of maceration is to obtain a juice which retains as much as possible of the desirable apple characters, and the process consists essentially of allowing the milled apple pulp (pomace) to stand for several hours before pressing. The defecation process (*i.e.* keeving) when carried out is usually preceded by maceration, the macerated pomace being pressed and the juice allowed to stand in open vats. Minute amounts of calcium carbonate and sodium chloride are usually added. When the process proceeds satisfactorily—and this depends among other things upon the variety of apple—"natural" clarification of the juice takes place. The clarification thus achieved is of practical value in the processing of the juice. In addition, the clarification brings about removal of some of the yeasts and of part of the nitrogenous material of the juice. This results in a slower and restricted fermentation which ceases before all the sugar has been fermented, thus producing a *naturally* sweet cider.

Advantages of Special Treatment

Many advantages are claimed for this method of cider-making: (1) the ciders are less liable to bacterial disorders, (2) naturally sweet ciders are said to be of better quality than ciders sweetened by the addition of sugar, and (3) sugar is saved. The second of these advantages was not, however, clearly demonstrated by the ciders of this group, since opinion was divided as to the relative

(*Concluded on page 293*)

Survey of World Grain Crops

WORLD supplies of grain by 1948 were larger than just before the war, while the amount entering world trade was greater than for many years, according to a recent publication* issued by the Commonwealth Economic Committee. The figures show the extent of the recovery attained, since during the war world output of bread grains (wheat and rye) declined by 30 per cent. As the war-time output of feed grains (oats, barley, and maize) had been fairly well maintained, only for rice was there some deficiency in output, and a larger deficiency in exports, in 1948.

The interruption of the normal flow of trade across the Atlantic during the war affected grain production not only in the exporting countries of the Western Hemisphere, whose European markets were lost, but also in Europe, which found itself cut off from supplies of fertiliser and machinery. Moreover, in several European countries the destruction occasioned by military operations and the displacement of labour made it difficult to expand cultivated areas in order to compensate for the decline in yield per acre. Thus world production of wheat, maize, oats, barley, and rye was down to 93 per cent. of the 1938 level in 1941 and 81 per cent. in 1945; by 1948, however, the comparable figure was 6 per cent. above the pre-war level.

Owing to pressure on shipping space the oversea movement of grain during the war was largely confined to wheat, since the available shipping was more economically used for livestock products than for feedingstuffs. Thus while imports of wheat into the United Kingdom, the principal importer, declined from 5 million tons in 1938 to about 3 million tons in the middle war years, those of feed grains fell from 4 million tons to only 100,000 tons.

Although Canada, Australia, the United States, and Argentina continue to provide most of the world's exports of wheat, and the proportion has risen since 1938, the trade is differently distributed among these four countries. Canada was formerly the major exporter, but recently this position has been taken by the United States, whose exports of wheat in 1948 were well above twice those of Canada.

All four countries were also major suppliers of oats and barley in 1948. Maize imports into the United Kingdom continued to come mainly from Argentina, despite the increase in United States production, though the quantity was much below the pre-war level. Moreover, the U.S.S.R. has re-entered the world grain market as an exporter on a considerable scale.

The Commonwealth is normally on balance an importer of grain, owing in the main to the heavy requirements of the United Kingdom. When these were much reduced in the later war years and Canadian exports were exceptionally large, there was a considerable export balance.

Since 1946 the Commonwealth as a whole has again become an importer, but not on so heavy a scale as before the war, although India's import requirements have increased considerably. The proportion of the world supply produced in the Commonwealth tended to increase for most grains over the war years.

Rice is shown to be a special case, for although production has regained the pre-war level the rise in population in Eastern countries has made an even higher level of production necessary to secure the same *per caput* consumption as before. Burma, Siam, and Indo-China, the main exporting countries, have not been able to resume exports on the pre-war scale, owing largely to the needs of their own increased populations. Thus, although by 1947-48 world production was approaching the pre-war figure, exports in the latter year from the main exporting countries, at some 3,300,000 tons, were only 42 per cent. of the pre-war volume.

* *Grain Crops*. Published for the Commonwealth Economic Committee by H.M. Stationery Office. Pp. 150+xxviii. Price 5s. net.

Efficient Operation of Drying Plant

Part V

LEO WALTER, A.M.I.Mech.E., A.M.I.Plant E.

In this article, the last of the series, are discussed modern trends in drier design which are indicative of the promising developments taking place in the food industry.

THE modern trend in multi-fan conveyor drying, whereby the goods are carried on an endless plate conveyor, allowing the air to pass in cross flow through the loose material, is shown in Fig. 1. A number of motor-driven fans draw the air across the material, where it is treated in a preheater stretching across the width of the drier, and reheated in individual heaters, before being blown against the underside of the conveyor. In this particular instance the material is very light, and the air stream tends to lift it up, so a second holding-down conveyor, which runs immediately above the carrying conveyor, is used. A modern feature is the direct motor-driven turbine fan, having constant speed and being of the no-overload type.

Basic Design of a Conveyor Drier

The basic design of a conveyor drier, which can be adapted for a variety of materials, ranging from cereals and coconuts to pharmaceuticals, colours, and dyestuffs, is shown in Fig. 2. Air is circulated from above through the material, which is carried on a perforated metal plate conveyor or woven wire belt. A number of fans throw the heated air against the material, but for certain materials air flow can be reversed, while still maintaining cross flow. By zoning the drying operation, the temperature of each zone can be controlled individually, preferably by means of automatic temperature controllers. The drier is built from a number of standard units and its total length can be adapted to meet requirements.

Pneumatic Driers

A more recent development is known as pneumatic drying whereby the feed material meets a current of hot air, is carried up a drying column, and is thereby kept in intimate contact with the hot air during its suspension. The hot air stream then carries the goods into a separator, where air velocity is reduced, the dried product falls out, and is drawn off.

It is important that for this method of drying the feed should be in a crumbly, friable, non-sticky condition. In certain instances the material could be premixed with some of the dry product, and thus made suitable for pneumatic drying.

As an example, starch drying has been successfully performed on a drier of this type. Starch gelatinises at 70° C., but it has been possible to subject it to much higher temperatures for very short periods without deterioration. Pneumatic drying uses inlet air temperatures for starch drying up to 280° C. without detrimental effects, such as breaking up or contamination, but the floating starch is in contact with the hot air for a matter of seconds only, and the final discharge temperature is not more than about 25° C.

Starch, milk, and other products have been dried pneumatically, and it seems that this method has good prospects for certain food products.

This example clearly indicates that very high air temperatures can be used during very short periods without detrimental effects on delicate substances. The shock effect of a high-temperature short-time drying opens up the pores of the dried substance, enabling the inner moisture to evaporate more freely than by prolonged low-temperature drying.

Rotary Louvre Plant

Particularly suitable for fragile and heat-sensitive products, rotary louvre plant will treat most solid materials with the exception of those in suspension or solutions in liquid (Fig. 3). In a typical installation, the material to be processed is fed by means of a vibrating feeder at an even and continuous rate into the rotary louvre drum. The heating and drying medium is provided by means of a combustion chamber which may

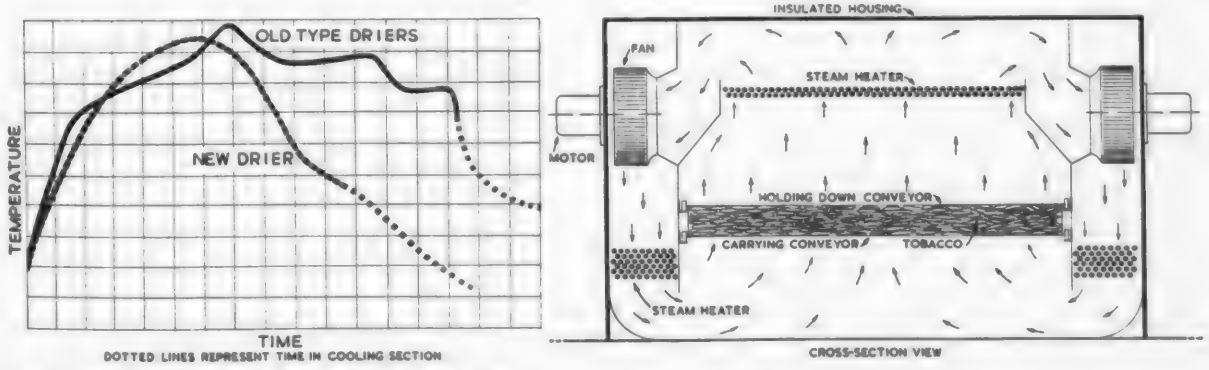


Fig. 1. Double conveyor drier with cross flow of hot air.
Courtesy Proctor and Schwartz, Philadelphia.

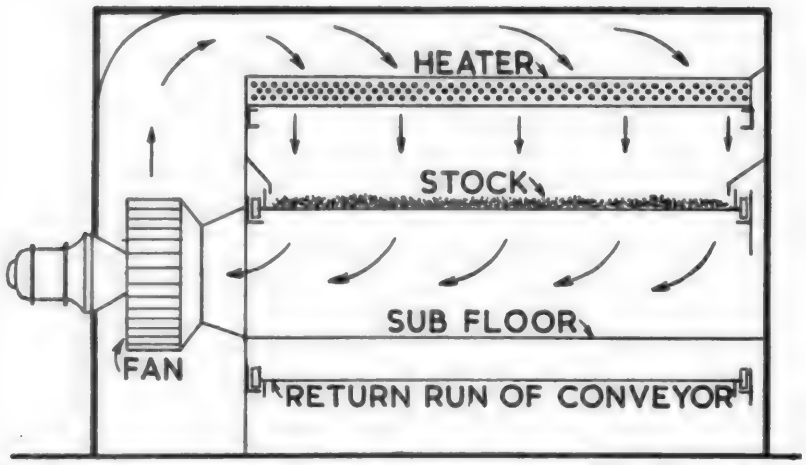


Fig. 2. Sectional view of large conveyor drier with metal plate or woven wire belt.
Courtesy Proctor and Schwartz.

be fired by oil or creosote pitch, gas, coke, or coal.

It is essential with some materials that an air heater be used, heated by steam, in which case the heater is located between the main fan and the drier hot air inlet.

The main fan is specially designed to suit the operating temperature, and induces the hot gases at a predetermined temperature, which is automatically controlled, and delivers them by way of the hot air inlet through the manifold into the effective gas channels which are covered by the material being subjected to treatment.

After passing through the material the exhaust gases, together with the evaporated water vapour, are extracted by means of the exhaust fan from the vaned and hooded discharge end.

The exhaust fan delivers the exhaust to atmosphere, and in the case where a proportion of dust is likely to be entrained in the stream (which occurs in handling very fine materials), a cyclone or other type of dust collector is installed between fan and drier.

The dried product is discharged continuously from the spigot or spout. It will be appreciated that the product and dust may be arranged for discharge in line for further processing.

Recirculation of Exhaust Gases

With some materials which may require reduced evaporation while heating up, and also to give a higher thermal efficiency, a portion of the partially saturated exhaust gases are recirculated, being mixed with the heating gases passing into the drum; a heating medium is thus provided with a higher saturation than would be normal.

Spray Drying

By atomising a liquid solution containing solid matter, and by subjecting the droplets to the evaporative effect of hot air during their suspension, the well-known method of spray drying has been developed.

Fig. 4 illustrates a spray drying plant, with rotary system of atomisation, used for milk and various other foodstuffs. The method of heating the air can be by means of a tubular air heater, supplied with steam, and using a temperature regulator for automatically adjusting steam admission. An oil-fired air heater can also be used, whereby the hot gases of combustion pass along banks of tubes, through which air is blown by means of a fan into the drying chamber. The air volume can be adjusted by means of dampers, thus ensuring correct pressure in the drying chamber. The standard instrument panel comprises U-tube water gauges for the measurement of inlet and outlet air pressure from the spray chamber and the internal chamber pressure. Inlet and outlet temperature is measured by dial instruments of the indicating type, although the dual-temperature recorder, which provides continuous records, is sometimes preferred, or two separate temperature recorders, as shown in Fig. 5, whereby electrical measuring instruments can also be fitted on the same panel for centralised control.

Vacuum Drying

Vacuum-drying chambers with trays are widely used for such materials as malt extract, coffee, cocoa, tea, sugar, fruits, and vegetables. They consist of a chamber having from 3 to 20 shelves, which are hollow and can be heated by

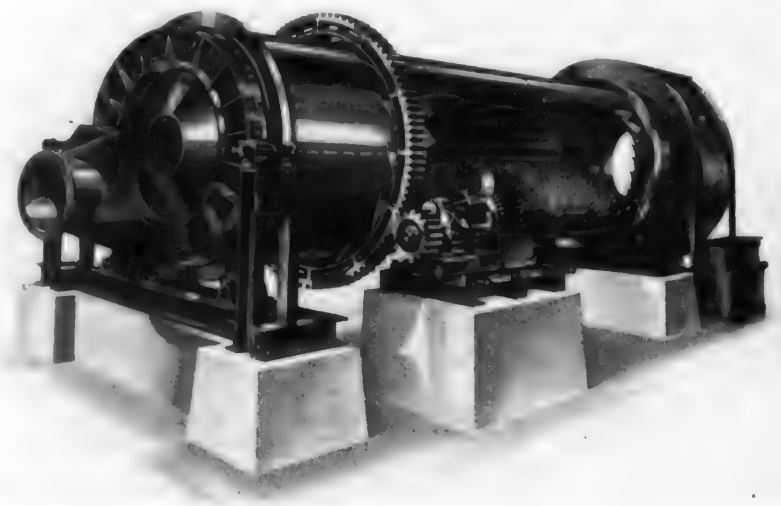


Fig. 3. Rotary louvre drier.
Photo Dunford and Elliott.

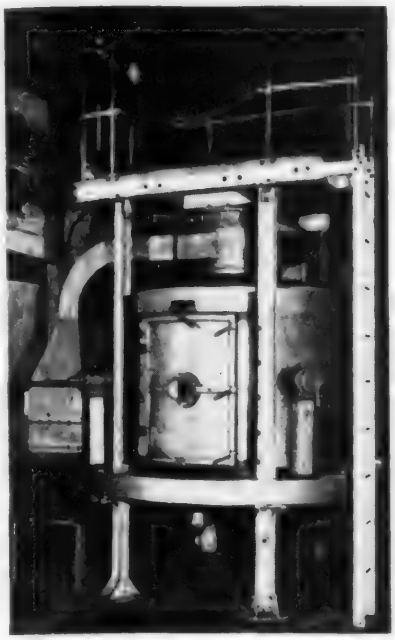


Fig. 4. Batch type spray drying plant.
Photo Kestner Evaporator and Engineering Co.

hot water, or by live or exhaust steam. Electricity or fuel oil can also be used as heating media.

Vacuum tray driers have one great advantage over hot air driers operating at atmospheric pressure in that the moisture in the material evaporates at a lower temperature. This in turn produces a greater rate of drying, at the same time preserving flavour and colour of the more heat-sensitive foodstuffs. Another of the advantages of vacuum drying is also that by holding a definite vacuum the temperature and humidity are controlled within the chamber with consequent uniform working conditions.

Vacuum tray driers are usually constructed of cast iron in square sections, or made from heavy welded steel with circular sections. The latter can have a jacketed top and bottom to prevent condensation of vapours within the chamber. The material for the trays can be made suitable for whatever is to be dried.

The efficiency of all types of vacuum driers depends upon the constant maintenance of the desired vacuum. It is also advisable to install a recording thermometer in place of the dial instrument. Regular checking of the vacuum pump, and periodical cleaning of the condenser and the receiver, will obviously add to drying efficiency.

Drying Kilns

The use of larger rooms for drying foodstuffs is common in certain branches of industry, and older installations do not take into account drying efficiency, but are solely based on output. As long as the latter can be maintained, heat consumption per dried unit and total drying efficiency are left to look after themselves.

Modern American malt drying kilns use programme control or time-pattern control for drying green malt. In order to apply a fairly high temperature without overheating the grain, and for maintaining a reasonable rate of drying during the rising period, programme control produces increase of temperature at a prescribed rate, thus ensuring rapid and complete drying without danger of product loss. For germination, drums are used from which the malt is transferred and evenly spread over the floor area of the multi-storey drying kiln. During the next twenty-four hours, the temperature is gradually increased from 90° F. to 110° F. on the top floor. The malt is then transferred to the first floor, and gradually heated to a final temperature of approximately 175° F.

Fig. 5. Temperature recorders on instrument panel.
Photo Elliot Bros.

Temperature Control

The instruments used are electronic-pneumatic temperature controllers; one is a recorder-controller, and a supplementary cam-instrument varies the actual drying temperature with time. An aluminium cam, cut in the shape of the desired temperature-time curve, is rotated by a clock mechanism, and resets pneumatically the control temperature of the main recorder-controller. In this instance, gas is the heating

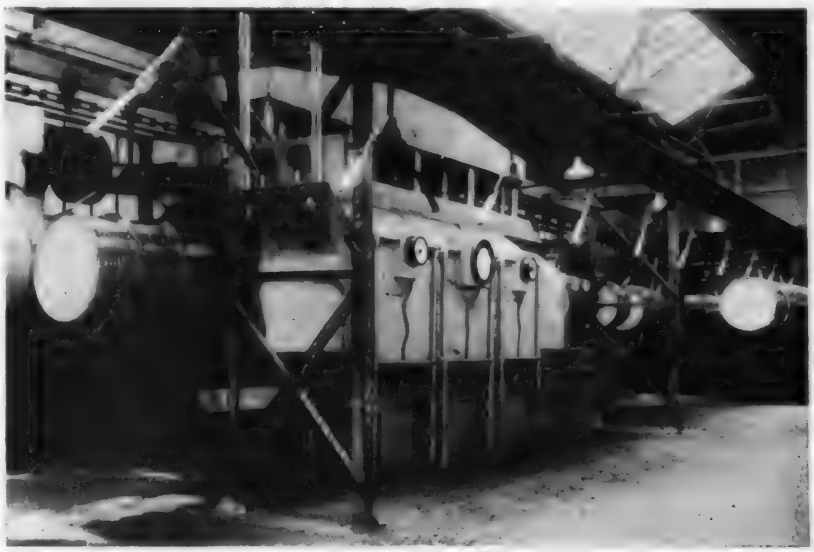


Fig. 6. Infra-red drying of lacquered containers.
Photo The General Electric Co.

medium, and a gas control valve adjusts gas flow to the burner, as predetermined on the cam curve. Air louvres on the bottom floor are set by hand. Louvres on the first floor adjust admission of fresh air to the products of combustion, and the mixture is drawn up by a suction fan on top.

In addition to automatic control, a separate multi-point temperature recorder produces continuous chart readings of malt temperature at various points.

Infra-red Drying

In recent years, the use of radiant heat rays emanating from incandescent surfaces has become more popular for convection heating, because it allows an open type of heating zone to be used for continuous drying. In infra-red drying, the material is subjected to a high rate of heating with consequent reduced drying time without detrimental effect on surface structure or colour. A continuous infra-red drier for drying lacquered containers is illustrated in Fig. 6.

Design of Plant

Some plants are already in use for drying such foodstuffs as icing sugar, by applying low temperature elements. Efficiently designed driers take the form of tunnel ovens with lagged walls, the material moving along radiant-heating elements, which usually have 250 watts per unit, and work on 115 volt supply. By switching lamp units on and off, the drying rate can be easily adapted to suit batches of different materials with consequent high drying efficiency and heat economy. An advantage of radiant drying, which is not always realised, is the semi-transparency of certain materials to infra-red heat rays, which thus heat up to a considerable depth with consequent good evaporation of inner moisture. The "soaking" period of convection heating by hot air is thus reduced when using this method of drying.

Such research as has been carried out with dielectric heating in the food industry is promising, but large-scale application of the method remains to be put into practice.

The Use of Solvents

THE first impulse when seeking information about a solvent is to look up "Durrans." A new edition* of this volume, the sixth, apart from a reprinting of the fifth edition, to appear in twenty years, enables a full appreciation of its value to be realised. The improvement in the printing and layout provides the reader with one of the most pleasing scientific books the reviewer has seen.

A welcome development is the enlargement of the chapter on the toxicity of various solvents together with the additional notes under individual solvents regarding their toxicity. The large difference in the toxicity of o. tricresyl phosphate as compared with the m. and p. compounds is mentioned, but no reason is given for this.

For those not engaged in the plastics industry it comes as rather a shock to realise that a solvent may be employed primarily as a plasticiser, and that the selection of solvents for special purposes is made more with a view to the end-product desired than to getting a medium into solution. The information which the author has collated on this aspect of the subject is extremely valuable.

A slight error in layout in earlier editions, by which abbreviations used in the second part of the volume appeared at the end of Part I, instead of the commencement of Part II, has been amended. It would be an added advantage if, in future editions, Dr. Durrans were to give the initials and names of authors in the references at the end of each chapter. In view of the large number of research workers and the duplication of names, it is preferable to know immediately to which person reference is being made. A future edition might also include a greater development of the first two chapters so as to give a much more comprehensive explanation of what solvent action really is and on what its power depends.

This is a book which should be on the shelves of all chemists.—T. McL.

* *Solvents.* By T. H. Durrans, D.Sc. (Lond.), F.R.I.C. Sixth edition. Pp. xv+242. Chapman and Hall, London. Price 21s.

Nutrition in Industry

HIS wide experience in a diversity of nutritional problems, particularly those encountered while Principal Scientific Officer to the Ministry of Food, has enabled Dr. Pyke to produce a book* on nutrition in industry which will appeal to a wide public.

Although he is careful to quote scientific data to support his recommendations, Dr. Pyke attacks the difficulties of sound industrial nutrition from a practical point of view. Many nutritionists have, in the past, been too forgetful of the important problems which arise in the presentation of food and in ensuring its consumption in the canteen or during the tea break.

Nutritional requirements under the wide variety of conditions encountered by people at work are well described; such matters as the best timing of meals to fit in with the demands of shift work and the preferences of operations are thoroughly discussed and solutions to many of these problems are clearly stated, although when giving the average calorie expenditure of a typist and a charwoman, the author did not check up his totals and the figure for a charwoman is shown as 2,035 instead of 3,035, which unfortunately destroys the point of the particular argument.

However, this is a minor slip, and the book can be strongly recommended to a wide public, and while it is of particular interest to the canteen and works manager, it will comprise a useful reference book for the student as well as for the practising nutritionist.—W. F. J. C.

* *Industrial Nutrition.* By Magnus Pyke, B.Sc., Ph. D., F.R.I.C. Pp. 205+vii. Macdonald and Evans, London. Price 10s. net.

The World's Dairy Products

THE progress made in the rebuilding of dairy herds and poultry flocks is illustrated in a recent publication.* With many countries continuing to encourage a high rate of fresh milk consumption, production and trade in manufactured products have been slower to recover. World exports of butter were 28 per cent. lower in 1949 than in 1938, largely because of the continued absence of shipments from Eastern Europe, although cheese and preserved milk shipments were appreciably higher than before the war.

The United States, which shipped vast quantities of dairy produce overseas during the war, has remained a more important exporter than before the war, partly through the operation of the European Recovery Programme and partly through increased shipments to other American countries and Asia. The increase in production in Western European countries, particularly Denmark and the Netherlands, is reflected in rising exports, mostly to the United Kingdom, their main pre-war market.

Thus, the Commonwealth proportion of world trade in dairy products in 1949 declined substantially, although the volume of shipments was well maintained. Nevertheless, the Commonwealth share of United Kingdom imports of butter, casein, and eggs in 1949, at 65 per cent., 70 per cent., and 24 per cent. respectively, was much higher than before the war; the proportion of cheese imports from Commonwealth countries shrank from 88 per cent. in 1938 to 63 per cent. in 1949.

Butter and Cheese

In the last two years butter has regained some of the ground lost to cheese and preserved milk, world exports in 1948 being 56 per cent. greater than in 1945, while a further increase of some 20 per cent. was apparent in 1949. Consumption levels have shown an upward trend, but in the United Kingdom and in the three great exporting countries of New Zealand, Australia, and Denmark, consumption per head under rationing is still much lower than pre-war. Shortages of butter have been offset to some extent by higher levels of margarine production and consumption in the United Kingdom and the United States, while in Denmark increased margarine consumption has compensated for the smaller amount of butter available for the home market and has enabled butter exports to expand.

Cheese production has remained appreciably higher than in 1938, and shipments in 1949 from nine major exporting countries were 38 per cent. greater than in the previous year. The improved level of butter and cheese supplies is reflected in United Kingdom imports, receipts of butter showing successive increases in each post-war year, while, with European and United States supplies exceeding pre-war levels, imports of cheese in 1949 were the highest since 1944.

Preserved Milk and Eggs

Production and exports of all forms of preserved milk have been maintained at much higher levels than before the war, the decline in exports from North America in 1949 being more than offset by increases in most Commonwealth and European countries. The most notable expansion has occurred in supplies of skimmed milk powder, output of which in the five major producing countries rose in 1949 to three times the pre-war level.

Countries of the Far East and Central and South America, where consumption of fresh milk is low, have absorbed increasing quantities of American and Dutch supplies, while European trade, although not so large as in the immediate post-war period, has remained well above the pre-war average.

The Netherlands has gone some way to re-establishing its pre-war position as the major exporter and was the main source of United Kingdom imports of condensed milk in 1949, although supplies of skimmed condensed were only half as great as pre-war. United Kingdom imports of milk powder in 1949 were much heavier than before the war, the chief supplier being New Zealand, with which a long-term contract was concluded in 1949.

The revival of egg production in the main pre-war exporting countries of Europe has been accompanied by a reduction in Canada and the United States, which exported large quantities of eggs and egg products in war-time. Exports of shell eggs have shown a considerable rise in every post-war year, but in 1948 were still only half as great as pre-war; a further increase of about 25 per cent. in 1949 was largely because of the heavier Danish and Irish supplies.

Exports of egg products have declined materially as egg production rose in war-devastated countries, but the improvement in Chinese supplies of frozen eggs was not maintained in 1949, when Australia and the United States were the United Kingdom's main sources of egg products.

* *Dairy Produce 1950*. Published for the Commonwealth Economic Committee by H.M. Stationery Office. Pp. 122+xii. Price 5s. net.

Long Ashton's Cider Sampling Day

(*Concluded from page 288*)

merits of the naturally sweet ciders and the control cider which had been sweetened with sugar.

The processes of maceration and defecation are extensively practised in France. The ciders of Group III were therefore of special interest to those present who later in the month visited France as members of the official party of cider makers from England.

During the afternoon additional single-variety ciders were available in the Cider House. Further attention was directed to the recommended varieties of cider apples by exhibits and charts. Maps showing the present distribution of cider orchards in the counties of the west country and some crop records were also exhibited. Visits were made to the plantations for inspection of trial bush plots and orchards and demonstrations of apple tree spraying.

News from the Industry

FORTHCOMING EVENTS

Marketing Scheme Enquiry

The Public Enquiry which was to have been held on June 5, 1950, into objections to a scheme submitted to the Ministry of Agriculture and Fisheries and the Secretary of State for Scotland for regulating the marketing of peas in Great Britain will now be opened by A. C. Longland, K.C., at the Bishop Partridge Hall, Church House, Westminster, S.W.1, at 10.30 a.m. on July 18, 1950.

*

The Royal Sanitary Institute

Meetings arranged by the Royal Sanitary Institute are as follows:

Newark-on-Trent Sessional Meeting. July 6, at 10.30 a.m. Papers on "Hygiene in Communal Feeding," by A. H. Walters, chief bacteriologist, Milton-Deosan Research Laboratories, and "Rural Planning," by R. A. Kidd, B.Sc., M.I.C.E., county surveyor and planning officer, Nottinghamshire C.C. In the afternoon visits will be paid to Hole and Co., Castle Brewery, the new power station, the Croid Glue Works, and Worthington Simpson, pump engineers. Chairman: J. B. Thomson, M.I.C.E., M.I.Mun.E., A.R.I.C.S. (Chairman of Council).

London Sessional Meeting. July 12, at 2.30 p.m. at the Institute. Paper on "The Prevention and Control of the Rheumatic Diseases," by Oswald Savage, O.B.E., M.R.C.S., M.R.C.P., assistant physician, Arthur Stanley Institute for Rheumatic Diseases, Middlesex Hospital. Chairman: The Rt. Hon. Lord Horder, G.C.V.O., M.D., F.R.C.P.

Great Yarmouth Sessional Meeting. July 14, at 10 a.m. Papers on "The Work of the Public Analyst," by Dr. Eric C. Wood, A.R.C.S., F.R.I.C., and "The Fishing Industry of Great Yarmouth," by G. H. Spinks, chief sanitary inspector, Yarmouth. In the afternoon visits will be paid to the Birds Eye Food Factory, a bakery, and a canning factory.

*

Mechanical Engineering Congress

The third International Mechanical Engineering Congress is to take place in Brussels from September 18 to 28, 1950.

The Congress will concern itself with such subjects as the roles of design and manufacturing processes; the selection of raw materials; control at various stages of manufacture; influencing consumers' requirements; and the part played by the human factor, including the educative influence of trade associations and governments in matters of quality.

About a dozen papers will be read with subsequent discussions; visits to certain factories will also be arranged.

Pest Control Association

The following officers and executive committee will serve the Industrial Pest Control Association for the year 1950:

President: Dr. F. P. Coyne (Imperial Chemical Industries).

Vice-President: Mr. S. W. Hedgcock (Chelsea Insecticides).

Hon. Treasurer: Mr. C. Stuart Kregor (W. Edmonds and Co.).

Hon. Auditors: Mr. C. L. Claremont (Rodent and Insect Pest Destruction Co.) and Mr. G. P. Pollard (Petrochemicals).

Executive Committee: Mr. T. A. Acton (Pesticidal Services (Ireland)); Mr. G. A. Emery (The Murphy Chemical Company); Mr. Duncan R. Leitch (Ratsouris); Mr. S. F. Sprange (The London Fumigation Co.); Mr. J. B. Wilton (Fumigation Services).

Secretary: Mr. W. A. Williams, M.B.E., B.Sc.

Deodorisation and Sterilisation

A method of simultaneous air deodorisation and sterilisation by means of ultra-violet radiation, known as air buvanisation, has been developed.

Intensive and persistent odours such as that of putrefying flesh and blood, vinegar, boiled fish and meat, and ethylene and other "fruity" odours, have been successfully destroyed in operational installations. Ultra-violet radiation of 2537 AU wavelength is effective in killing airborne bacteria, viruses, and moulds and their spores, thus preventing infection among workpeople and the goods they handle.

New Potato Crisp Factory

The erection of another potato crisp factory has been approved in Scotland. The latest addition to this growing industry is planned for Lauriston, Stirling, where the Aberdeen firm of George Mollison and Sons are to erect a modern plant.

Hygienic Food Handling

Prepared for the benefit of their staff engaged in catering or dealing with foodstuffs, a manual entitled *Hygienic Food Handling* which has been produced by Marks and Spencer is a record of their experience in directing a campaign to achieve a high standard of cleanliness in catering. The general character of the problems and the steps to be taken have been stressed so that the manual will be of interest to others outside the firm.

Background information making for a better understanding of the importance of hygiene is given in section I. Section II surveys the factors involved in hygienic food handling and describes the firm's approach to various problems. The last section sets out various rules and measures which have been found to give high standards of hygiene in present-day conditions.

Research at East Malling

The recent members' day at East Malling Research Station attracted about 250 Fellows, members, and associates, who came to see and discuss the research in progress on soil management and biennial bearing.

The programme, which consisted of tours of the experimental plantations, was opened in the morning by Dr. D. W. P. Greenham dealing with soil management. He surveyed the general nutrition of fruit trees, stressing the important part played by organic matter in maintaining good soil conditions. Valuable results of research directed towards making the orchard self-supporting by means of cover-cropping, using annual crops, two-year leys, or permanent swards, were shown.

On another part of the station the visitors were shown new trials of weed killers compared with straw mulching. The main purpose of the experiment was to see how safe the materials used (DNOC in oil emulsion, MCPA, and sodium chlorate) were for fruit trees.

After lunch Dr. W. S. Rogers introduced the subject of biennial bearing. Ways of controlling this were now known, but cheap, practical methods for large-scale application were needed. The afternoon's tour ended with an informal discussion between members and research staff.

E.V.A. Luncheon

In proposing the toast "The Battery Electric Vehicle" at the annual luncheon of the Electric Vehicle Association of Great Britain, held in London on May 28, the Rt. Hon. Alfred Barnes, P.C., M.P., Minister of Transport, said that he considered himself instrumental in introducing one of the first electric vehicles into the field of distribution soon after the first world war, when he was chairman of the Stratford Co-operative Society. He spoke of the progress made in the industry, quoting that in 1938 there were 4,000 battery-driven vehicles in operation in Great Britain—a figure which, by 1949, had increased to 15,000.

The efforts of the Association to get the electric vehicle included in the list of exemptions in the Purchase Tax Order were described by Mr. Peter Rochs, chairman, who also spoke of the attempts made by manufacturers to effect sales in export markets; these had not met with any great success because the vehicle was specifically designed for house-to-house deliveries, which is a general and established practice in this but not in other countries, and because of the high initial cost.

That the electric vehicles already in use in Great Britain had saved 14,250,000 gallons of petrol annually, representing a saving of some 2,500,000 dollars, was emphasised by Mr. Rochs. It followed that every additional electric vehicle supplied to the home market would save approximately 1,000 gallons of petrol per annum and free for sale to other countries a petrol-operated vehicle which was much more readily exportable.

Sir John Kennedy, O.B.E., President of the Association, was unavoidably absent by reason of illness.

Garden Party at Crux Easton

Mr. Schwitzer, Dr. Lewis, Mr. W. Leonard Hill, Dr. Booer, Mr. Holmes.

Rear-Admiral Bolger, U.S.N., Mrs. Bolger, Mrs. Hill, Lady Tempany.

Members of the Agriculture Group of the Society of Chemical Industry were entertained at a garden party by Mr. and Mrs. W. Leonard Hill at Crux Easton on Saturday, May 20.

The guests, after partaking of refreshments, visited the home farm, the glasshouses, and then the gardens, gay with spring flowers, where a pleasant hour or two were spent. The scene was an animated one. Agricultural scientists chatted with farmers, industrialists mingled with chemists, and manufacturers exchanged views with engineers.

It was getting on for 6 o'clock before many of the guests felt able to tear themselves away from such an attractive setting and from the prodigal hospitality of their host and hostess.

Among those who accepted invitations were:

Mr. R. C. Baker; Mr. and Mrs. R. P. Blackadder; Mr. W. V. Blewett, Rear-Admiral and Mrs. Bolger; Dr. and Mrs. J. R. Booer; Mr. J. O. Cherrington; Mr. and Mrs. T. Crosbie-Walsh; Dr. and Mrs. J. G. Davis; Mr. B. Donovan; Mr. R. Dudley; Mr. H. S. Foster; Dr. and Mrs. J. Furlong; Lt.-Col., Mrs. and Miss Griffin; Miss E. Grossbard; Mr. D. J. Halliday; Dr. G. V. B. Harford; Mr. T. K. Hodder; Mr. E. T. Holmes; Mr. Anthony Hurd, M.P., and Mrs. Hurd; Miss M. G. Jackson; Mr. T. Jeffries; Dr. and Mrs. A. H. Lewis; Mr. A. G. F. Machin; Mr. and Mrs. A. W. Marsden; Mr. G. B. Masefield; Mr. E. Midwinter; Mr. R. Milton; Mr. and Mrs. W. G. Norris; Mr. R. Paterson; Mr. J. Randall; Dr. and Mrs. S. J. Rowlands; Mr. R. Scott Russell; Mr. M. Schwitzer; Mr. K. Lynn Shaw; Mr. B. C. L. Summers; Sir Harold and Lady Tempany; Mr. T. Wannop Williamson; Mr. A. Ward; Mr. B. Ward.

Groups on the lawns.

The lawns seen from the veranda.

Appointments

Sir Rowland Smith has been elected chairman of Ford Motor Company, following its twenty-first annual meeting.

Starting life in the motor industry forty-six years ago as an apprentice, he joined the company in 1924 on the sales side, and in 1928 was appointed general manager. Subsequently he became director, then managing director, and two years ago deputy chairman. He was knighted in 1944.

Sir Rowland is also chairman of the Kelsey Hayes Wheel Company, director of Lincoln Cars, a member of the Institute of Mechanical Engineers, a Fellow of the Royal Society of Arts, Renter Warden of the Glaziers' Company, and a Freeman of the City of London.

▪

Mr. F. J. Wymer, C.B.E., general assistant to the chief regional officer, Southern Region, has been appointed assistant chief regional officer, Southern Region, Waterloo.

▪

Mr. C. W. Messenger has been appointed by Dunlop as a new assistant in their advertising department to deal with advertising for the General Rubber Goods Division and Dunlop Special Products.

▪

Lt.-Col. Maurice Batchelor, J.P., of Batchelors Peas, has been appointed President of Appeal for the Royal Commercial Travellers' School for 1950.

Cleaning of Heat Exchangers

A new way of cleaning plate heat exchangers used in milk processing has been developed by the laboratories of the A.P.V. Company. This method depends on the use of a special detergent known as the Paracleanser; used with the routine described in the company's leaflet on the subject, it will yield bright, scale-free plates with virtually no brushing.

The process is intended for use with installations embodying the Paraflow heat exchanger, but is applicable to all plate-type milk heat treatment plants. Where high temperatures are employed, some brushing and acid treatment may be found necessary.

With close plant and laboratory control, results should be as good as with the more normal system of daily brushing, but where such facilities do not exist it is not recommended.

Obituary

Mrs. Montague Gluckstein, widow of one of the founders of J. Lyons and Company, on May 10 at the age of 89.

From the founding of Lyons in 1887, Mrs. Gluckstein showed an intimate interest in the development of the firm, and when the company's first catering contract was gained at the Newcastle Exhibition, she went there with her husband and helped in the organisation of the catering services.

She had a limitless fund of interesting stories of Edwardian and Victorian times, and of the days when Lyons was establishing itself in face of almost unanimous predictions, by rival concerns, of failure.

Floodlit Factory Tower

The famous 90 ft. clock tower which was erected in 1866 as part of the original factory of Peek, Frean and Co., London, is once again illuminated by floodlights from dusk until 11 p.m. daily.

The four Benjamin Type J floodlights used are each fitted with spreader glass and 1,500 W. G.S. lamps; they have a universal movement with external control and presetting device on both the horizontal and vertical axis, enabling the projector to be returned to its original training after cleaning or lamp renewals.

Canadian Market Prospects

Taken from a Dollar Sterling Trade Board memorandum prepared by Mr. C. B. Powell, chairman of the Processed Foods Division of the Board, information on the Canadian market for processed foodstuffs has been prepared by the Commercial Relations and Exports Department of the Board of Trade. The Dollar Sterling Trade Board is the Canadian counterpart of the Dollar Export Board.

The information is set out under the headings: the market for processed foods; imported food sales prospects; review of the Canadian market; representation; requirements for successful marketing; and market development.

Quoting Sir Cecil Weir, chairman of the Dollar Exports Board, it is stated in conclusion that as "the development of Canadian resources continues . . . there will be almost unlimited opportunities for expansion of two-way trade."

Packaging Requirements

The functional aspects of packaging from the standpoint of the retail trade, with emphasis on the needs of the multiple, chain, and department store, formed the subject of a paper read to the Northern Area of the Institute of Packaging by Mr. E. H. Dickens, M.B.E., vice-chairman of the Institute. He dealt briefly with certain requirements of the package manufacturer, the product manufacturer, and the ultimate user, before going on to state some of the considerations which must be taken into account to ensure arrival of goods in factory-fresh condition, to facilitate handling and stocktaking, and to afford protection while on shelves. The package must be of a type which was easy to open (and reclose if necessary), be provided with instructions for use, and be of a handy size for storage.

In analysing the difference between the price of a package and its cost, Mr. Dickens pointed out that if the quality of the package were cut so as to result in a certain proportion of damage to the goods, the retailer frequently lost money because of the clerical cost of making returns and sending debit notes. It was therefore cheaper in the long run to spend more on the package itself.

Observations were also made on the standardisation of packages, advertisement (from the identification of contents angle), stocktaking, and foodstuffs.

Protection for the worker and the product.

Industrial Cleaning

The maintenance of a high degree of cleanliness, the collection of spilled products such as flour, cocoa, and tea, and the removal of dust from delicate equipment such as scales and balances, as well as from motors and more elaborate machinery, are three of the problems encountered in food factories and warehouses.

These difficulties are efficiently dealt with by the Martindale industrial cleaner with its bin collector and Vokes type filter, and by a range of portable blowers which can generate an air blast as high as 300 miles per hour.

Another product of the Martindale Electric Co. is the protective mask, which is light, comfortable, and yet effective without being cumbersome and interfering with conversation. The mask serves the double purpose of protecting the worker against the harmful inhalation of fine dusts, and the product against contamination during manufacture and packing. The mask itself weighs less than ½ oz. and can be supplied with renewable hygienic refills.

Price Reductions

Price reductions of their storage block dairy sterilising chest and 100 VA soil warming transformer have been announced by The General Electric Company.

Ice Plant for Stornoway

A scheme to erect a new ice plant building at Stornoway, Isle of Lewis, Scotland, is proposed by the Herring Industry Board.

S.C.I. Agriculture Group

REPORT FOR SESSION 1949-50

That the Group has continued to draw a varied and interested audience during the session 1949-50 is reflected in the number of applications for membership, is reported by the hon. secretary of the S.C.I. Agriculture Group.

Nine meetings were held during the year, four of these being held jointly with other bodies, and the subjects have covered a wide range of agricultural interests.

Mr. E. B. Anderson gave the Jubilee Memorial Lecture to the Group at a joint meeting with the London Section and Food Group at the Royal Institution. Another successful joint meeting was that with the British Society of Soil Science, when six papers under the general title "Chemical Aspects of Soil Fertility" were read at an all-day meeting. A third meeting with the Fertiliser Society and the Society of Public Analysts and Other Analytical Chemists also stimulated considerable interest in the methods of assessing phosphatic fertilisers.

The summer outing in June, 1949, was to the Experimental and Research Station, Cheshunt, where the Director, Dr. Bewley, and his staff entertained members and conducted them round the laboratories and glasshouses.

During the year the first Panel of the Group was formed as a direct result of the 2nd International Congress for Crop Protection held in London during July, 1949, and sponsored by the Society. The inaugural meeting of the Panel took place in April, 1950, when members heard Dr. H. Martin deliver an address entitled "Advances in Chemical Methods of Crop Protection."

During the year members of the Food and Agriculture Group Committees have met to discuss closer co-operation between the two Groups. It was decided that one or more joint committee meetings might be profitable, but that each Group should retain its own identity and autonomy.

The programme for next year is now being prepared.

New Food Premises

A new fruit packing factory is to be erected at Cheltenham by Gloucestershire Marketing Society; the cost of the factory is estimated at £120,000.

▪

Oxo are negotiating for a site at the junction of Emma Place and Chapel Street, Stonehouse, Plymouth, for the proposed erection of a factory.

▪

Cadbury Bros. propose building a milk processing factory at Wilton, Ross, Herefordshire.

▪

Plans have been prepared for a new factory and offices to be built at Ayres Road, Stretford, for the International Biscuit Co.

▪

Factory and warehouse extensions are to be carried out at the premises of Kellogg Co. of Great Britain in Park Road, Stretford.

▪

A new biscuit factory at the Forest of Dean, Cinderford, Glos., is planned by Meredith and Drew.

▪

Dairy Produce Packers are planning to extend their factory premises at Conderdun Road, Newcastle-upon-Tyne.

Clips for Storing Milk Cans

An efficient and hygienic method of storing milk cans and pails after washing and sterilisation is provided by the Churnclip—an aluminium alloy bracket approximately 10 in. long, for securing to dairy walls, which is made by Clare's Service. To store milk cans, the bottom flange is inserted under the inverted hook and allowed to fall gently forwards, when the utensil will hang securely by its own weight. Milking pails are stored by being placed upside down on the top point of the clip.

An easily handled vacuum cleaner for use in industry.

Industrial Vacuum Cleaner

Although a powerful machine of some 55 in. water lift, strongly constructed, and able to deal with dust and swarf of every description, a new industrial vacuum cleaner is easy to handle in confined spaces, having small wheelbase and low centre of gravity.

Dust is collected in a strong canvas bag of 1½ cu. ft. capacity in the upper part of the vertical cylindrical sheet steel container. This bag can be removed and replaced in a few seconds. The power unit consists of two high velocity motor-driven fans working in tandem; these are mounted in the base and have a maximum consumption of 1,200 W.

The whole unit is mounted on a pair of pneumatic-tyred wheels with one ball-bearing castor at the front. It is wheeled like a sack barrow or will follow wherever the operator leads with the hose. Racks are provided to carry suction nozzles and also the hose when these are not in use.

The machine, which is made by the Service Electric Company, can be converted instantly to high velocity blowing for the removal of dust from the insides of electric motors and other places difficult of access.

Insurance in Industry

In response to requests from personnel managers and welfare officers for information which will assist them in their work, the Ministry of National Insurance have prepared some notes on how, when, and where to claim the different National Insurance and Industrial Injury benefits.

U.S. Buys British Motors

Knowing full well the "Coals to Newcastle" nature of the task, Newman Industries set out to sell electric motors in both Canada and the U.S. This highly competitive market called for a new range of electric motors to be designed to meet special requirements of standardisation (N.E.M.A. standards), and the chairman of the company, Mr. A. J. Newman, visited North America to work on the problem. As a result, the initial shipment of electric motors was made recently.

The availability of this American type electrical equipment will also be a very useful aid to British machine tool and other machinery manufacturers who are endeavouring to increase their sales in North America.

The firm anticipate that this development in their export programme will result in sales totalling several million dollars per annum.

Change of Address

On June 1 the headquarters of the Department of Scientific and Industrial Research were removed from Dorland House and Rex House, Regent Street, London, S.W.1, to Charles House, 5-11, Regent Street, London, S.W.1. The telephone number (Whitehall 9788) remains the same.

For the time being the headquarters of the Hydraulics Research Organisation (Sir Claude Inglis) and the Mechanical Engineering Research Organisation (Dr. G. A. Hankins) will remain in Rex House, Regent Street, S.W.1. The new telephone number of these organisations will be Whitehall 1952.

Emulsifying Agent

Produced in the form of free flowing pure white flakes, Admul glyceryl monostearate may be used for the improvement of quality of ice cream, margarine, and synthetic edible creams, and for the purpose of uniting fat and water, thus acting as a fat extender. It can also be used for the preparation of an emulsion for tin greasing which will withstand high baking temperatures.

Manufactured by Advita from glycerol B.P. and triple pressed stearic acid, it melts at approximately 56° C., and contains less than 0·25 per cent. free fatty acid. Owing to its flaked form, it dissolves rapidly and more stable emulsions are formed with greater ease. Its colour permits it to be incorporated in a pure white mix; undesirable flavour is absent and the product is odourless.

Interchangeable Motors

A new range of A.C. motors, initially between 1 and 20 h.p., based on American and Canadian standards, has been developed by Crompton Parkinson.

For some years, American and Canadian manufacturers have had common standard frame sizes to make their motors interchangeable, but British frame sizes have been interchangeable neither with American and Canadian frames nor with those of other British manufacturers.

The new range will have standard American frames, but will be available with alternative horse-power ratings, *i.e.* one design for those markets requiring American standard dimensions and ratings, and another of identical dimensions, but with greater horse-power, for the British market where compactness is required.

This interchangeability will enable British manufacturers to meet the requirements of all markets.

Trade Mark Transfer

The trade mark Rofex, registered under No. 640828 in respect of compositions of emulsified fatty acid esters for use in greasing cooking utensils, was assigned on November 25, 1949, by Stanley Walmsley (acting as liquidator of Romos Laboratories, Limited), of 11, Old Jewry, London, E.C.2, to M.R. Chemical Products, Limited, of 22, Moorgate, London, E.C.2, without the goodwill of the business in which it was then in use.

Nutrition Society Report

No great change in total membership is reported by the Council of the Nutrition Society for the period May 29 to December 31, 1949, the number of fully paid up members on December 31 being 706. Honorary membership of the Society has been conferred on Lord Boyd-Orr, Dame Harriette Chick, and Sir Charles Martin.

The main activities of the Society have been the publication of its journal and the holding of scientific meetings. On October 15 a conference was held in Birmingham to consider "Triglyceride Fats in Human Nutrition" and another conference was held on October 29 in Glasgow to consider "Meat."

Dr. L. J. Harris has continued his work in connexion with the founding of an International Union of Nutritional Sciences. A Provisional Committee of the proposed Union met in Copenhagen in September, 1949, and plans were discussed for an International Nutrition Conference in 1952. Miss Hollingsworth was invited to serve on a sub-committee to consider the possibility of putting food tables on a more satisfactory basis for international use.

Closure Manufacture

The tinplate position showed no sign of improvement, said Mr. John Ryan, M.C., M.A., B.Sc., chairman of the Closure Manufacturers' Association, at the annual general meeting held recently. South Wales seemed unlikely to augment its present output and the deterioration in quality which existed at some points tended to grow rather than the reverse. In addition, the demand from overseas buyers for tinplate had increased since devaluation and constant vigilance was required on the part of the Council to see that the quantity available to closure manufacturers was not reduced.

There were price increases in steel, coal, and transport rates, but he did not think there would be any major change in the price of tinplate.

Progress in the provision of aluminium sheets of appropriate thickness for the industry had proceeded, and they were thus able to benefit from increased capacity and improved methods. In this connexion the scale of extras charged for small orders had been before the Council and some alterations to the advantage of users had taken place.

Industrial Safety

SOCIETY'S CONFERENCE AT SCARBOROUGH

Reviewing the events of the past year at the National Industrial Safety Conference held at Scarborough recently, Lord Llewellin, President of the Royal Society for the Prevention of Accidents, revealed that a deputation from the Society had waited on the Minister of Labour and proposed the setting up of a co-ordinating committee—representing Government departments, employers' organisations, trades unions, and voluntary bodies—to review the whole problem of industrial safety.

It was decided, however, that the setting up of such a committee could not be usefully undertaken at the present time, but the Society did not intend to abandon their proposals. The President mentioned that plans were being made for introducing safety training into technical schools.

As a first step towards the encouragement of higher standards of safety, they had formed a small committee, including industrial safety experts and educationalists, to consider what action could be taken. They had received encouragement from many quarters, and two of H.M. Inspectors of Education had visited one of their safety officers' training courses to see what the Society was doing in that direction. The Society had always maintained that the proper place to learn industrial safety was inside the works, and they believed that if boys and girls received a good basic safety training from the technical schools, the task of the employer would be made easier.

Lord Llewellin next dealt with the help that could be given to particular industries and suggested that there should be co-operation between the Society and the joint industrial councils of the various industries.

He went on to refer to the reports of the productivity teams that had been visiting the U.S.A. to study American methods, and remarked that one team had written of works safety committees, safety propaganda, and other safety measures as if such things were unknown in Britain.

"One is forced to the unwilling conclusion," he said, "that the representatives of certain industries know very little about organised accident prevention and, when visiting the U.S.A., made their first acquaintance with safety methods which they could have seen practised by other industries in their own country."

Newer ideas of accident prevention, the woman operative's attitude to accident prevention in industry, colour schemes, the design of machine tools, and co-operation between personnel were subjects dealt with in other papers.

Stepping Up Production

More than 200 delegates were present at the conference on "Materials Handling" held by the Institution of Production Engineers (western section) in Bristol recently. Mr. R. S. Brown (President of the section) said that the subject of the conference was one which vitally affected the future of Britain in that it was one sure method of increasing production.

Ways and means of improving output were discussed, photographs and scale working models of materials handling equipment were on view, and a technical film, "Prelude to Power," was shown.

Representatives of the Anglo-American productivity team gave the conference examples of American productivity technique, and talks on time and motion study, as well as general materials handling and trucking, were included in the programme.

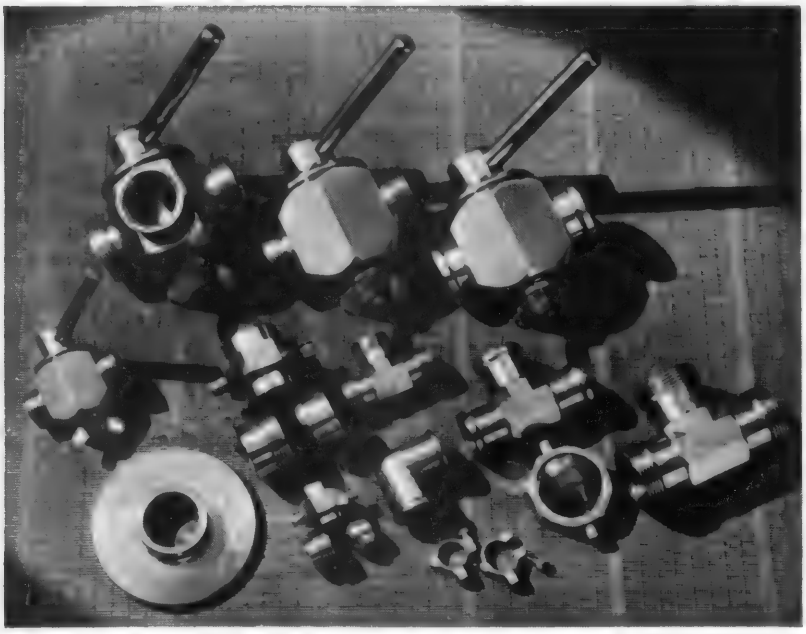
Novel Works Outing

A novel form of works outing was organised by George Ellison and their associate company, Tufnol, when a party of fifty-two employees flew from Birmingham to Amsterdam; another group made a similar trip the following week.

The party toured Dutch rural areas and returned to Amsterdam for lunch. In the afternoon they were taken on a sight-seeing tour by motor launch along the canals. After dinner at the airport restaurant, planes brought the visitors home.

Poisons Chart

A chart outlining the provisions of the Pharmacy and Poisons Act, 1933, and the Poisons Rules, 1949, relating to sales of insecticides, fungicides, weedkillers, and rodenticides has been prepared in booklet form by the Association of British Insecticide Manufacturers.



A range of stainless steel pipe fittings for the food industry.

Hygienic Pipe Fittings

Machined from castings or bar, and polished internally as well as externally, no fabrication or welding being used, a range of pipe fittings in 18/8/3 stainless steel for the food industry is being manufactured by The Realm Engineering works.

The metal to metal cone type unions give an uninterrupted flow to the liquid, and the Acme threads are hard wearing and strong.

The Realm-Howard fittings are available with the American I.A.M.D. standard connexions, or alternatively with recessed ends for sweating on to the pipe, in sizes to suit 1 in., 1½ in., 2 in., 2½ in. outside diameter pipe.

In addition to unions, elbows, tees, and flanges, the range includes full bore plug cocks and "T" and "L" ported three-way cocks; to eliminate seizing, the plugs of these cocks are hard chrome electroplated before grinding and lapping into the body.

New Hygiene Officer

Allan W. Ritchie, former Chief Sanitary Inspector of Edinburgh, has been appointed to the newly created post of Food Hygiene Officer for Scotland. He will serve on the staff of the Department of Health for Scotland, and will assist Local Authorities in the care and direction of clean handling of food in their own areas.

Institute of Export

Compiled from particulars furnished by members themselves up to January 1, 1950, a list of members has been published by the Institute of Export for the confidential information and use of members.

The Institute is a professional organisation, incorporated under licence of the Board of Trade, for the purpose of serving the interests of the nation's overseas trade and of the men and women engaged in conducting it.

Mobile Flue Cleaning

A mobile plant to undertake the contract cleaning of Lancashire boilers and the like has been produced by the British Vacuum Cleaner and Engineering Company.

The plant, built on a short chassis lorry, consists of a primary cyclone with rotary valve discharging into a two-way sacking chute, two intermittent cyclones, and two with 36 in. filters with bucket containers, as well as an eight-stage turbo exhauster. Power is provided by a 12/24 h.p. water-cooled Morris motor. A hand-operated valve is fitted to allow one sack to be emptied while the other is in use, so that it takes only forty seconds to fill one 100 lb. sack. The cyclone is constructed and fitted with counterweights so that it can be folded down when the lorry is in motion.

New Lighting Reflectors

Two new fittings, known as Fluroliers Types H and K, have been added to the comprehensive range of industrial and commercial lighting reflectors by Benjamin Electric.

Type H has been designed to meet the demand for a twin 5 ft. unit having continuous channelling features. This fitting provides similar facilities to the Type F series, but has a wiring channel larger in cross-section which contains auxiliary gear, mains wiring, etc.

The new Type K is suitable for a 4 ft. 40 W. bi-pin fluorescent lamp, special bi-pin lampholders being used.

Metal Turnings Crushers

Practically all classes of metal turnings produced by automatic screw machines and lathes can be reduced from tangled masses into short chips by means of flextooth metal turnings crushers manufactured by British Jeffrey-Diamond. This greatly facilitates handling and permits more compact and better storage.

The turnings are fed to the machine through a large opening directly above the rotor and are engaged by hammers, which effect an efficient reduction and give a clean discharge of broken chips through the screen bar grid fitted in the base of the machine.

Can Labelling

A thorough tabulation of labelling difficulties, their causes, and correctives is given in a new, revised edition of *Successful Can Labelling*, a publication issued by National Adhesives. Among the principal troubles are staining, rusting, slipping or crooked labelling, loose labelling, failure of machines to pick up labels, tearing and poor adhesion, curling, and wrinkling at the overlap. Recommendations for correction are based on years of research by the firm's engineering staff.

The brochure also discusses spot and overlap labelling methods, both by machine and hand, for cylindrical, square, and oval tin cans as well as glass and fibre containers, and touches briefly on label grain direction, type and weight of stocks.

Considerable space is devoted to methods for determining can temperatures, and a chart and other material from which canners may easily select the proper pick-up gums, both hot and cold, are included.

BOOKLETS RECEIVED

Brief descriptions of their many business interests are contained in a well-illustrated booklet produced by Pettits of Reedham, Norfolk. Interesting articles cover the work carried out at the packing station, the pig industry, the company's family food reserve scheme, and poultry stock improvement.

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Articles on a wide variety of subjects to suit all tastes appear in a recent issue of the magazine of the 600 Group. Apart from cartoons, short stories, and news items, there are some colourful photographs of the works of K. and L. Steelfounders and Engineers and notes on new developments within the Group.

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In addition to a specification of Sturtevant propeller fans, details of the swivelling type pedestal mounted man cooling fan and notes on the selection of a propeller fan, methods of installation, and overall dimensions are included in the company's leaflet No. 3002.

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Designed and produced in a form so as to serve as a vehicle for exhibiting paper in a wide range of uses, the first issue of *The Bowater Papers* has been published by the Bowater Paper Corporation. This colourful publication covers the history, art, science, and literature of the manufacture and use of paper. It is lavishly illustrated and excellently produced.

*

Manufacturers considering for the first time the possibility of selling in the U.S.A. will be interested in the booklet *First Steps in the United States Markets*, issued by Colman Prentis and Varley. This gives information about regions and population, cities and shopping areas, industrial markets, types of retail stores, and methods of selling and testing a market. Several coloured maps accompany the text.

*

The use of Pyrex brand glass in industrial heat exchange applications is illustrated in a brochure issued by James A. Jobling and Co. Tubular heat exchangers, spray or evaporative coolers, electric glass immersion heaters, bayonet-type heaters and coolers, coiled condensers and boilers, and pipeline coils, all incorporating this glass in their construction, are described.

OBITER DICTA

• Phenomenal keeping qualities can be imparted by "atomic canning." — *Chicago grocers in conference.*

• Did you know that in Tibet a "delicious" soup is concocted by boiling butter, tea, and water together? — *U.S. Nutrition News.*

• Perhaps the Food Ministry would publish a recipe telling housewives how to cook rabbit in Algerian wine.—*Mr. Thorneycroft, M.P.*

• I came to the conclusion that the greatest curse of the Groundnut Scheme was the aeroplane and its biggest mistake the building of airstrips. —*Alan Wood.*

• Aren't there any little lambs born into the world today? Has Socialism aged the cattle as it has us poor women?—*Mrs. D. Keat at the annual conference of the Conservative Central Women's Advisory Committee.*

• If Durham N.F.U. had their way, only products containing fresh milk would be labelled "ice cream," all other such products would be labelled "ices."—*At a Press conference of the Durham County Branch Executive N.F.U.*

• I do not think it fantastic to look ahead to the days when the fishmonger will receive fish ready for sale in Cellophane and the butcher will receive his joints Cellophane wrapped and chilled.—*Mr. H. R. Pochin, area chairman of the National Chamber of Trade.*

• I am amazed that any young woman with pretensions to education or refinement (or any hope of attracting a proposal of marriage) can allow herself to be seen in the street not merely eating an ice cream, but actually licking it.—*Retired schoolteacher in a letter to the "Daily Mirror."*

• The meal we have just enjoyed represents the ideal—simple food of the country, perfectly cooked. There was nothing gargantuan about it, and it was without any of the sauces that so often camouflaged inferior food and bad cooking.—*Mr. Bernard Sheppard, Vice-President of the Dublin Branch of the Wine and Food Society.*

Based on sodium silicate, Crosfield detergents are used in a wide variety of industries, and specialised detergents have been compounded to meet every type of cleaning operation. To assist in choosing the correct detergent for any specific cleaning task, the firm have issued an interesting and instructive booklet entitled *Crosfield Detergents in Modern Industry.*

*

The uses of a valve positioner, its operating principle, and construction are fully described in *Multi-functional Valve Positioner*, a leaflet recently produced by Negretti and Zambra. This instrument is for use on direct acting (closing with applied air pressure) or reverse acting (opening with applied air pressure) diaphragm control valves, and is suitable for control line pressures of 15, 20, or 25 p.s.i. and for output pressures up to 40 p.s.i.

Company News

An all-time record of production and turnover was reflected by the results for the year ended December 31, according to the report of Mr. Harold St. J. Judd, chairman of the United Glass Bottle Manufacturers. Increased costs have been offset by improvements in mechanisation and the results of technical research.

The company manufacture a wide range of glass containers from tiny vials to 10 gallon acid carboys, so that some falling off in sales of certain types of bottles is being made up by increased sales of other types. On the whole, sales have been satisfactorily maintained in both home and export markets.

*

The considerable increase in turnover achieved by the British Pepper and Spice Co. was partly accounted for by the price of pepper, which had reached record levels, said Mr. Desmond A. Smith, chairman, in his statement at the 17th ordinary general meeting of the company. Supplies from the East had been scarce, but had been sufficient to meet their requirements.

During the current year business had been quieter because wholesalers were not willing to stock pepper on account of the high prices, but there was a steady consumer demand. The subsidiary companies had had a busy year with increased volume of home and export business.

A dividend at the rate of 15 per cent., less tax, was recommended.

World Food News

Glass-packed Vegetables

Glass-packed vegetables are being prepared and marketed by Batchelor and Co. (Ireland).

Known as the "Crystal" pack, it has an attractive appearance, the range of products including garden peas, French beans, whole carrots, asparagus, and mushrooms. The glass containers are manufactured by an Irish concern, the only part of the pack which is imported being the metal cap.

Pepper Research in India

The Agricultural Department of Madras has been making arrangements to start an experimental pepper garden at Mattanur, North Malabar, to conduct research and also to encourage pepper cultivation in rural areas on a scientific basis. A pepper specialist has been appointed to work the scheme, and 35 acres of land have been acquired for the purpose.

Pepper has assumed considerable importance in the export trade from the Malabar coast, the value of the current year's export being estimated at between Rs. 15 and Rs. 20 crores. The average output of pepper in the Indian Union at present is placed around 30,000 tons per annum.

Indian Rice Crop

The All-India Second Estimate of Rice, 1949-50, puts the area sown at 65,962,000 acres, as against 63,247,000 acres for 1948-49. This is equivalent to an increase of 4·3 per cent.

The estimate covers the period up to the end of November and the beginning of December, 1949; until then the condition of the crop was reported to be satisfactory on the whole except in Madras, where the crop has been adversely affected by the cyclones in the northern districts and the failure of north-east monsoons in the eastern districts.

The increase in acreage has occurred mainly in Assam, Bihar, Bombay, Madras, West Bengal, Madhya Pradesh, and Hyderabad, and has been attributed partly to the favourable weather conditions at the sowing time and partly to the "Grow More Food" campaign. In Bihar, however, the increase is due to the change in the method of estimation.

During the three years ending 1947-48, the average area given in the Second Estimate comprised 95·7 per cent. of the average of finally revised figures and the average yield per acre was placed at 697 lb. of cleaned rice.

Fish Recipes

Intended to acquaint consumers with methods of cooking fish so that its nutritive value and flavour are not impaired, a booklet entitled *100 Tempting Fish Recipes* has been issued by the Department of Fisheries, Ottawa. A list of the edible fish and shell-fish taken by Canada's commercial fishermen and the various forms in which they are marketed, rules for buying and keeping fish, and methods of overcoming fishy odours, are also included.

Meat Institute Appointments

Mr. George M. Lewis, director of the American Meat Institute's Department of Marketing, was elected a Vice-President of the Institute at a recent meeting of the board of directors in San Francisco.

A member of the Institute staff since 1930, Mr. Lewis is a native of Texas, and holds degrees from A. and M. College of Texas and Harvard University. Prior to his association with the Institute, he was in charge of livestock and meat studies for the Bureau of Business Research of the University of Texas, and made crop and livestock estimates for the U.S. Department of Agriculture.

He is also director of the Institute of Meat Packing, conducted jointly by the American Meat Institute and the University of Chicago, which offers courses in subjects related to the meat packing industry.

S. African Canning Industry

The South African canning industry, almost non-existent before the war, has expanded substantially and, it is believed, will be able to meet all requirements for canned food in about two years' time. Plans for tinplate production to meet the industry's needs are said to be well advanced.

At the end of the war the Union had twenty-one factories engaged in the manufacture of canned foods as compared with eleven factories in 1939. In 1947 the output of canned fish, other than crawfish, had risen to 15 million lb., more than double the 1944 figure, and the 1949 figure is estimated to be still higher.

The South African jam and canned fruit industry is making a strong bid for the Belgian Congo market.

Road Transport of Perishables

IMPROVEMENTS PLANNED BY U.N.

Experts of the United Nations Economic Commission at Geneva recently concluded a three-day session devoted to considering questions associated with the transport of perishables by road. Special reference was made to categories and types of vehicle, and also the ranges of temperatures they would maintain inside the body while outside temperatures were within specified ranges.

The categories and classes defined by the experts make it possible for transport users to be given more precise information as to the efficiency expected from various types of equipment. They will also guide manufacturers of vans, trailers, and semi-trailers in their efforts to satisfy existing or potential requirements for vehicles. Further, it is considered that standard definitions will assist carriers in their purchases and in the operation of specialised road transport equipment.

A team of experts will be convened to define the minimum equipment standards to furnish the required efficiency prescribed by the newly established categories and classes; they will also study and report on the various types of insulation and methods of refrigeration, as well as matters related to the construction of vehicles, which might give rise to standardisation or to general application.

This work forms part of the general programme of the Economic Commission of Europe, designed to develop and improve the transport of perishable foodstuffs, to ensure an improvement in the standards of European diet, and to stimulate trade in agricultural and dairy products and meat and fish. Previous meetings have already been held relating to quality standards of perishables and to the standardising of packing and conditions of carriage.

Italian Canned Foods Show

The fifth International Canned Foodstuffs Show is to be held in Parma from September 8 to 25. Numerous European, American, Asiatic, and African firms have already applied for exhibition space. As well as all kinds of canned foodstuffs, the show will include a large selection of machinery and packaging materials.

British Trade Week in Lima

The British Chamber of Commerce, Lima, is proposing to hold a British Trade Week early in September. Every firm concerned will arrange a display on its own premises, with suitable window dressing wherever possible. In addition, there will be centralised publicity in the newspapers, on the radio, and by means of posters.

A trade directory giving details of all British firms represented in Peru will be published and distributed before the Trade Week takes place. Arrangements are being made to install a Commercial Information Bureau, staffed jointly by the British Chamber of Commerce and by the Commercial Secretariat of the British Embassy, which will be situated in the offices of a British steamship company in the centre of the city.

All enquiries about the event should be sent to: The Secretary, British Chamber of Commerce, Edificio "La Nacional" 402, Ayacucho 309, Lima, Peru.

Continuous Butter Machine

Among novelties seen at the *Salon de la Machine Agricole* was a butter manufacturing machine shown by Breil and Martel which produces butter continuously three minutes after it is set in motion.

The apparatus does not modify buttermaking technique appreciably, since it performs the usual churning, drying, and working of the butter, but it incorporates several improvements.

An 880 lb. per hour capacity machine replaces a 770 to 880 gallon churner-worker, thus reducing bulkiness, and various problems have been tackled, including regularisation of temperature inside the churning cylinder, sparsity of fat in buttermilk, and washing. The French machines also have solved the problems of treating acid creams and regulating the humidity rate at the international level in continuous butter production.

Solving Dollar Problems

One of Canada's largest food distributors, Mr. C. B. Powell, recently paid a visit to England for the purpose of solving dollar export problems. Chairman of the Process Food Division of the Canadian Dollar Sterling Trade Board and President of Powell and Company, Montreal, Mr. Powell spent six weeks having talks with the Dollar Exports Board, the Ministry of Food, the Board of Trade, and the various British industries concerned.

Bad Year for Fishermen

The fishing industry in Northern Ireland has had a rather difficult year, it is reported by the Northern Ireland Minister of Commerce.

Landings of sea fish in 1949 were valued at £207,000 compared with £365,000 in 1948, which was, however, a record year. The largest part of the decrease was in white fish. There was a similar reduction in the value of fresh-water fish caught in Northern Ireland in the same year. The return to competitive conditions will present new problems to both producer and distributor.

The problem of finding additional and improved accommodation for the fishing fleets had been the subject of detailed examination by technical advisers over a considerable period, and the result of their labours at Portavogie, for example, was at the present time under active consideration by the Ministry in conjunction with the Down County Council.

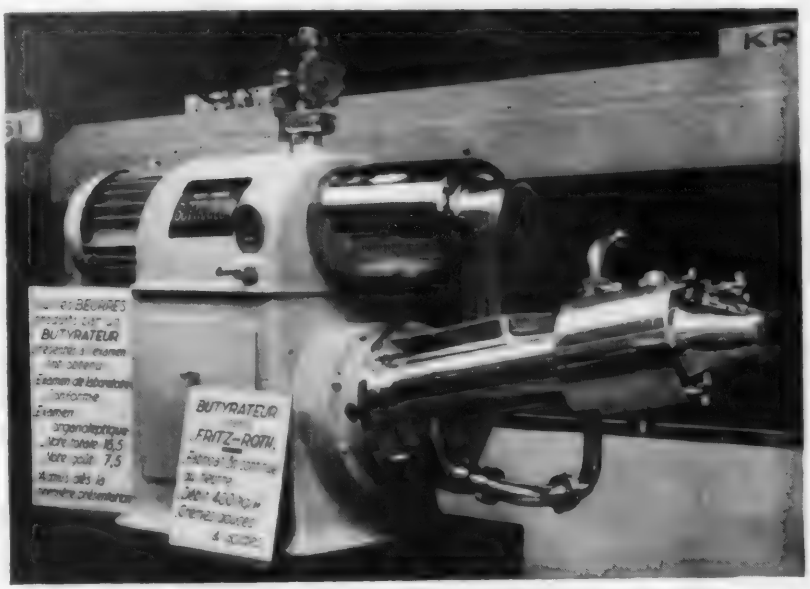
DDT Plant for Mysore

A new DDT factory and technical institute is to operate shortly in Mysore. The insecticide has already been put to good use in the State's drive for food self-sufficiency, and one district has been cleared of mosquitoes, thus enabling an additional 4,500 acres of land to be brought under cultivation.

Protein Extract from Skimmed Milk

A process for the production of protein extract from skimmed milk has been perfected by a South African biological chemist, Mr. L. Hegedus, with a team of co-workers. The extract produced contains all the essential amino acids in highly concentrated form and is cheap enough to be used on a mass basis.

Besides being exported, it is being used increasingly by South African clinics and hospitals for feeding non-Europeans who are protein-starved and whose resistance to disease has consequently broken down. Medical authorities in the Union are now stressing the value of proteins as the main ingredient in preventive medicine. Owing to shortages and high prices, many of the Union's poorer people cannot get enough protein foods to eat. The alternative is to make protein extracts cheaply available, and the possibility of fortifying mealie meal, the staple food of natives in both rural and urban areas, is being investigated. At present, however, the cost factor, even with the new South African process, is the greatest hindrance.



A machine for producing butter continuously three minutes after it is set in motion.

OVERSEAS ENQUIRIES

Adhesive Tape and Confectionery

The United Kingdom Trade Commissioner for the Maritime Provinces and Newfoundland reports that Mr. Ellis Price, 127, Inglis Street, Halifax, wishes to represent United Kingdom manufacturers of transparent sticking tape and of confectionery (plain and wrapped toffee). Mr. Price already handles lines closely associated with those for which he is now seeking agencies.

Firms are invited to communicate direct with Mr. Price.

▪

Rice Plant

The Commercial Secretary to the British Embassy at Bangkok has been approached by Athon Panich Co., Ltd., 105-112 Samyod, New Road, Bangkok, who desire to be furnished with illustrated catalogues relating to rice hullers and polishers.

United Kingdom manufacturers interested in this enquiry are invited to submit copies of their trade literature and quotations, together with delivery dates, direct to the firm.

▪

Dehydration and Oil Expressing Plant

An enquiry for United Kingdom manufacturers of plant for dehydrating bananas and plant for expressing oil from Brazil nuts has been received from the Corporacion Peruana del Amazonas, Peru.

In the first case, the plant should be capable of handling up to 500,000 lb. of dried bananas annually. The second type of plant required will be for expressing from 3 to 5 tons of oil daily, but if the smallest unit available is capable of expressing more oil than the quantity mentioned, the Corporation will still be interested.

In the cases of both plants, Diesel power units will be required, as local supplies of power are not likely to be available.

Interested manufacturers are asked to advise the Commercial Relations and Exports Department of the Board of Trade (quoting reference C.R.E. (IB) 51787/50) and to forward catalogues or descriptive literature of the plant they can supply, together with export prices (if possible c.i.f. Callao) and a note of the delivery time required. These details will be forwarded to H.M. Commercial Secretary at the British Embassy, Lima, for the information of the Corporation.

Assorted Biscuits

The United Kingdom Trade Commissioner at Singapore reports that the Trading Company "Holland," Ltd. (Handelsvereeniging "Holland" N.V.), P.O. Box 612, 137-137A, Cecil Street, Singapore, wish to obtain an agency for assorted biscuits.

The company operate as general importers and exporters; agencies are held on a commission basis and the firm cover Malaya and Singapore.

United Kingdom firms interested in this enquiry should communicate with the company direct.

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Food Processing Machinery

H.M. Consul-General at San José, Costa Rica, reports that Señor Otto Drodz, Apartado 1266, San José, wishes to be put in touch with United Kingdom manufacturers of sugar mills, distilling plant (using molasses), food processing machinery, and oil presses (vegetable oils).

It is understood that Señor Drodz, who has been established since 1929 as a commission agent specialising in machinery and industrial equipment of all kinds, is making this enquiry on behalf of one of his clients.

Interested United Kingdom firms are invited to send illustrated literature direct to the address given.

▪

Confectionery Products

The United Kingdom Trade Commissioner at Toronto has reported that James Smith, Ltd., Rear 58, Essex Street, Toronto, are anxious to obtain the agencies of United Kingdom firms for a wide range of confectionery products, preferably on a purchasing basis, although commission or consignment arrangements would be considered if necessary. Sales are made to wholesalers and retailers; the firm also operate as distributors, covering the Province of Ontario, including the city of Toronto. Contacts have been established with confectionery wholesalers throughout Ontario as well as with the large departmental and chain stores.

The company are in a position to carry stocks and have refrigeration facilities available for handling lines susceptible to heat.

Firms interested in this enquiry are invited to communicate with James Smith, Ltd., direct, quoting prices c.i.f. in Canadian currency.

Food Flavouring Plant

The United Kingdom Trade Commissioner at Montreal reports that Stuart Bros., Ltd., of 3470, St. Antoine Street, Montreal, propose to establish, either in Jamaica or Trinidad, a plant for the manufacture of food flavours.

The company propose to look to the United Kingdom for sources of supply of the following equipment and other requirements for the establishment of the plant:

Laboratory equipment: graduates, beakers, measures, glass stirring rods, glass funnels, analytical appliances, filter paper, etc.

Vacuum stills: 80 gallon nickel alloy or stainless steel.

Vacuum pumps: for use with the vacuum stills.

Percolators: for use in extraction of liquor from vanilla beans and ginger root.

Jaw or rotary crushers: suitable for ginger root.

Hammer mill pulverisers: suitable for ginger root.

Glass bottles: 1 gallon and 20 oz. size amber coloured. At least 6,000 to 7,000 of each type will be required annually.

Folding cartons: as shipping containers for dozens of the gallon and 20 oz. bottles.

The equipment would be ordered for delivery direct to Jamaica or Trinidad, but the decisions on purchasing would be made in Canada.

United Kingdom manufacturers interested in this enquiry are invited to send catalogues (with samples where suitable) to Stuart Bros., Ltd., at Montreal.

Moroccan Chocolate Industry

A chocolate industry which produces sufficient to meet home requirements, leaving a surplus for export, has been built up by French Morocco, a country which before the war imported all her chocolate requirements.

There are now three large chocolate factories with a production capacity of about 1,500 tons per annum and employing a labour force of 160.

In 1938, French Morocco imported 332 tons of chocolate with exports practically nil; in 1949 the industry imported only 12 tons of chocolate, while exports had increased to 180 tons of cocoa and 225 tons of block and powdered chocolate.

The industry is concerned that too liberal import laws might result in dumping on the Moroccan market and thus adversely affect the newly established industry.

News from the Ministries

Prices of Sheep and Lambs

Revised prices to be paid by the Ministry of Food for sheep and lambs exported from the Irish Republic to Great Britain have been agreed between the Ministry and the Department of Agriculture, Dublin. These prices reflect the increases granted to farmers in the U.K. as a result of the February price review and operate from April 17, 1950, to April 15, 1951.

Merchandise Marks

Exemption Directions under the Merchandise Marks Act, 1926, which continue, for a period of twelve months from the date of the Directions, suspension of the marking requirements in respect of imported currants, raisins, sultanas, butter, bacon, ham, dead poultry, and meat, formerly suspended under Orders issued by the Ministry of Food, have been made jointly by the Minister of Agriculture and Fisheries and the Secretaries of State for Scotland and the Home Department.

Cake Decorations from France

Arrangements have been made for a limited quantity of cake decorations to be imported by the trade under individual licence.

Under these arrangements, French manufacturers are offering assorted coloured pearls, cones, and flowers (other than crystallised flowers which are on open general licence), crystallised seeds, and *non pareil*. Consideration will, however, be given to applications for other types of cake decoration. The total quantity of cake decorations (including any types not specified above) that may be imported by each applicant is limited to 5 tons.

Applications for import licences should be made in duplicate on the usual form ILD/A, obtainable from the Board of Trade, Import Licensing Department, Romney House, Tufton Street, S.W.1. The forms should be endorsed with details of the quantity of each type of cake decoration to be imported within the permitted total of 5 tons, and of the values f.o.b. and c.i.f. For administrative convenience, completed application forms should, in the first instance, be submitted to the Bakery Division of the Ministry of Food, London Road, Stanmore, Middlesex.

Committees of Investigation

In view of the possibility of new marketing schemes coming into force in the near future, it has been decided that the Committees of Investigation, appointed under the provisions of Section 9 of the Agricultural Marketing Act, 1931, should now be resuscitated.

The duty of each of these Committees is to consider and report to the Minister, if the Minister in any case so directs, on:

(i) Any report made by the appropriate Consumers' Committee appointed under Section 9 of the Agricultural Marketing Act, 1931 (the reconstitution of these Committees is now under consideration).

(ii) Any complaints made to the Minister as to the operation of a marketing scheme applicable either to England and Wales, Scotland, or Great Britain, as the case may be, which could not be considered by a Consumers' Committee.

(iii) Any question referred by the Minister under the provisions of Section 2(3) of the Agricultural Marketing Act, 1949, which deals with directions that may be given by the Minister to marketing boards.

The Committee of Investigation for England and Wales now consists of Richard O'Sullivan, K.C. (chairman); J. T. Corbett; C. N. Gallie; R. F. Kahn, C.B.E., M.A.; and J. Ryan, C.B.E., M.C., M.A., B.Sc.

The same Committee has been appointed to act as the Committee of Investigation for Great Britain.

The Committee of Investigation for Scotland comprises Sheriff James Walker, K.C. (chairman); Prof. Henry Hamilton, M.A., D.Litt. (Glasgow); Prof. Ian W. Macdonald, M.A., C.A.; C. N. Gallie; and J. B. Crawford, J.P.

The Secretary of the England and Wales and of the Great Britain Committees is Mr. A. H. Fitt of the Ministry of Agriculture and Fisheries, 36-38, Chester Terrace, Regent's Park, London, N.W.1, and the Secretary of the Scottish Committee is Mr. P. Nish of the Department of Agriculture for Scotland, St. Andrew's House, Edinburgh, 1, who will also act as Assistant Secretary of the Great Britain Committee.

Manufacture of Clotted Cream

EXPERIMENTAL SCHEME TO ASSIST FARMERS

Arrangements have now been completed for the operation as from June 1, 1950, of an experimental scheme to assist farmers on remote hill and upland farms in Somerset, Devon, and Cornwall to rear more calves for beef by licensing those farmers to sell clotted cream from milk produced on their own farms, and to feed the skim milk to calves.

Any farmer in these areas with marginal or hill land similar to that found in the districts of Exmoor, the Brendon Hills, Dartmoor, and Bodmin Moor, who intends to rear as many calves as possible and who wishes to take advantage of this scheme, should apply to his County Agricultural Executive Committee for a licence to make and sell clotted cream. The County Agricultural Executive Committee will supply an application form which should be completed and returned to them. The applications will be considered jointly by the County Agricultural Executive Committee and the Regional Milk Supply Officer of the Ministry of Food. Where applications are approved, the licence will be issued by the Regional Supply Milk Officer acting on behalf of the Minister of Food. If the County Agricultural Executive Committee later considers that a farmer is not carrying out his declared intention to rear calves, the licence may be revoked.

The licence will be valid in the first place up to the end of May, 1951. It will permit the farmer to make and sell clotted cream of a minimum butterfat content of 50 per cent. by weight from milk produced from his own farm or farms within the stated area. The holder of a licence will not be allowed to sell any cream other than clotted cream which has been produced in the traditional manner by scalding, cooling, and skimming.

Farmers licensed to sell clotted cream must mark all containers leaving their farms with the words: "Clotted cream (50 per cent. minimum butterfat)." The container must also bear the farmer's name, address, and licence number, and a statement of the minimum weight of clotted cream in the container.

Patent Office Official Retires

The Assistant Controller of the Board of Trade Patent Office, Mr. B. C. Crewe, has retired after nearly fifty years' continuous service. Mr. Crewe is an international authority on copyright and on industrial property.

Syrup, Treacle, and Dried Fruit

The Syrup and Treacle Order, 1950, and the Dried Fruits (Amendment No. 2) Order, 1950, which came into force on May 28, 1950, prohibit the supply of syrup, treacle, currants, muscatels, raisins, and sultanas to manufacturers except under permits issued by the Ministry of Food.

Until now the flow of these supplies to manufacturers has been controlled under the points rationing scheme by permits issued under the Food Rationing Orders. The effect of the amending Order will be to continue this control now that the points rationing scheme has ended so as to safeguard supplies for consumers.

The Syrup and Treacle Order, 1950, replaces the Syrup and Treacle (Maximum Prices) Order, 1941, as amended, and contains a revised definition of syrup and treacle.

Chocolate Couverture

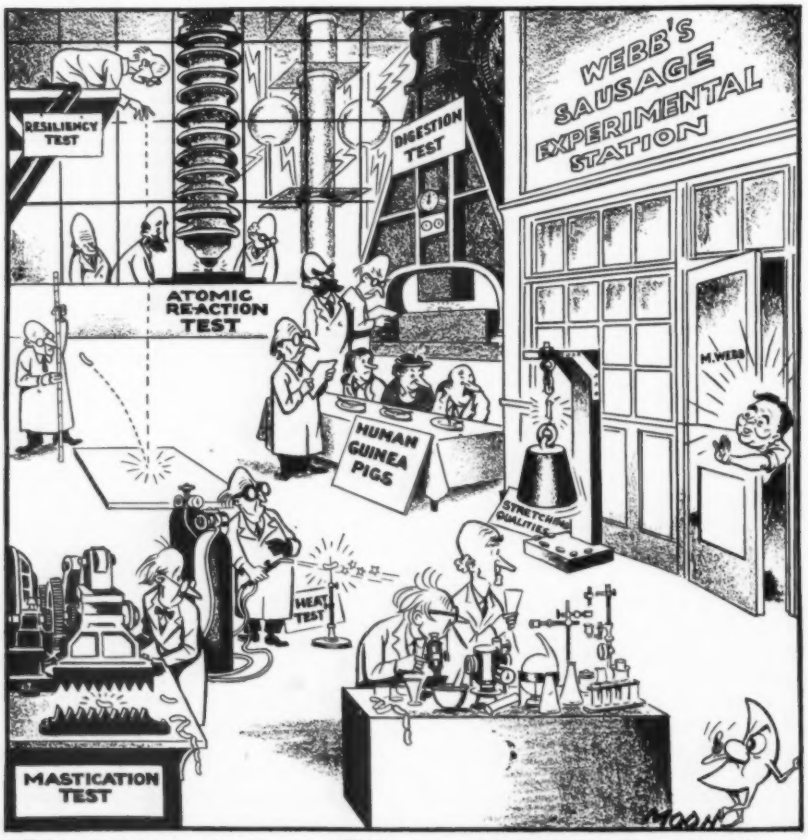
The Chocolate, Sugar Confectionery, and Cocoa Products Order, 1949, has been amended so as to increase, by amounts ranging from ¾d. to 3¼d. per lb., the prices of certain varieties of chocolate couverture manufactured from high-grade cocoa beans. The price at which these beans are sold to manufacturers was increased at the beginning of March last because of increasing world prices.

The new Order came into force on May 15, 1950.

Fish Agents' Offices Closed

The Port Fish Agents' Offices at Edinburgh, Hull, Lowestoft, Swansea, and Newcastle-on-Tyne have closed down.

All communications concerning the Fish Transport Scheme, including accounts for payment, should now be addressed to the Port Fish Agent's Office, 202, Victoria Street, Grimsby, Lincs. (for ports covered by the Hull and Lowestoft offices), or to the Finance Director, Ministry of Food, Fish Division, Carlton Hotel, Pall Mall, London, S.W.1 (for ports covered by the Edinburgh, Swansea, and Newcastle-on-Tyne offices).



"Hold everything! I've got it! We'll put a teeny-weeny bit more meat in!"
Courtesy the "Sunday Dispatch."

Increase in Bread Subsidy

The rate of bread subsidy for England and Wales will be provisionally increased by 2s. 6d. from 3s. 4½d. to 5s. 10½d. per sack with effect from March 26, 1950. The figure of 3s. 4½d. disregards the 1d. allowed for 50 per cent. of trends in the present subsidy rate.

This provisional increase has been granted in order to save bakers from any hardship that might be caused by the unavoidable delay in the discussions between the Ministry of Food and the Trade Accountants on the revision of the rate of bread subsidy from March 26, 1950. The final rate of subsidy for this period will be announced when these discussions have been completed, and payments made on the provisional basis will then be adjusted.

Canadian Wheat for the U.K.

The Canadian and the United Kingdom Governments have now reviewed the results of the talks which took place recently in London between Mr. C. D. Howe, Canadian Minister of Trade and Commerce, and Mr. L. B. Pearson, Canadian Secretary of State for External Affairs, and the Chancellor of the Exchequer, the Secretary of State for Commonwealth Relations, and the Minister of Food on the subject of the United Kingdom's wheat requirements in the crop year 1950/51 within the framework of the International Wheat Agreement.

Both Governments are agreed that this Agreement removes the need for a contract to replace the existing Anglo-Canadian Wheat Agreement which expires at the end of July.

The United Kingdom Government has made it clear that out of its total wheat import requirements in 1950/51 it expects to buy a large proportion in Canada. It is hoped that the United Kingdom will be able to meet its requirements for dollar wheat from Canada under the International Wheat Agreement; this should be possible provided that such wheat can be purchased on terms which, as regards price, quality, and position, are not less favourable than those obtained by any other buyer in the dollar market, whether in the United States of America or in Canada. The Canadian Government, for its part, is satisfied that Canadian wheat growers will continue to find in the United Kingdom a market for a very substantial part of their exportable wheat.

Information and Advice

Curry Powder

B.4196. *Can you give me details of a method for curry powder which is popular to British taste?* (India.)

Recipes for curry powders are legion, but we offer the following as a basis for trial:

	oz.		oz.
Turmeric ...	8	Fennel	2
Coriander ...	8	Chillies	2
Cumin	8	Mace	2
Dry ginger ...	4	Cloves	1
Pepper	4	Mustard	1
Cardamom ...	2	Poppy seeds ...	1

These ingredients are all ground to a fine powder.

Marmalade Manufacture

B.4387. *We should be glad to receive details of various types of English marmalade.* (Denmark.)

The following three recipes are typical for the manufacture of English orange marmalade made from Spanish Seville oranges:

Fine and Coarse Cut Orange Marmalade.—The cases are opened and oranges divided into three grades—(1) oranges of good colour and ripeness, without blemishes; (2) green oranges; and (3) oranges with blemish and rough skin.

Green oranges are put into boxes and left to ripen. Blemished oranges can be used for juicing and peel manufacture. The selected oranges are washed in tanks of warm water and cut in quarters. The peel has to be kept separate from the dummies. The quartering operation is done either by hand or machine. The quartered peel is cut to the required thickness, which varies according to taste and custom. After cutting, the peel is cooked until soft. The dummies are cooked in a different pan or steaming barrel and sieved through a pulping machine. Dummy pulp and peel are then mixed together and left to stand for about twenty-four hours. The following composition is recommended for a good grade:

	lb.
Sugar	66
Fruit	50
Water	15
Approximate total weight ...	131

Water to boil out amounts to 31 lb., giving an output weight of 100 lb. Soluble solids amount to 71 lb.

Chunky Marmalade.—Oranges are graded in the same way as for fine cut marmalade. The peel is cut either by hand or machine into chunks about $\frac{1}{4}$ in. thick and $\frac{1}{2}$ in. long and boiled in water until soft. The dummies are boiled separately and sieved. After sieving, the pulp is mixed with the soft chunky peel. Sugar is added (70 parts of pulp to 30 parts of sugar) and the mixture boiled for about ten minutes. The boiled preparation is kept in casks or tins for not less than four weeks to enable the sugar to penetrate the peel. Care must be taken to watch for mould development. After four weeks it can be boiled in the same way as ordinary marmalade, allowing for the sugar already used in making the preparation.

Jelly Marmalade.—The general procedure is similar to that described above with the exception that the peel is usually shredded in special shredding machines. The shredded peel is boiled in water until it is tender and can be easily crushed between the fingers. The dummies are pulped in the usual way, and the juice is prepared by filtering the steamed pulp through filter presses or filter bags. Frequently clarifying agents are used to obtain extreme clarity. This juice is mixed with the shredded peel and absolutely clear filtered sugar. The preparation of the ingredients and the boiling method are the same as with ordinary marmalade.

Information Supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.4255. *Homogenising plant for the manufacture of synthetic cream.* (Scotland.)

B.4260. *Plant for peeling, slicing, and dicing pineapples, and a small canning plant for handling fruit and vegetables.* (Sussex.)

B.4263. *Equipment for smoking salmon.* (Herts.)

B.4265. *Butter yellow for use in foodstuffs.* (London.)

B.4266. *Dry ice for packing sausages.* (Ireland.)

B.4274. *Machinery for the production of puffed wheat and other puffed cereals.* (London.)

B.4281. *Bags for the packing of potato crisps.* (Notts.)

B.4287. *Metal cans.* (Yorks.)

B.4288. *Odourless frying media of vegetable base.* (Singapore.)

B.4292. *Emulsifiers.* (Holland.)

B.4295. *Hand-operated dicing machines.* (Lancs.)

B.4299. *Quaternary ammonium compounds, and vacuum extruding machinery.* (Norfolk.)

B.4303. *Nut roasting equipment.* (Lancs.)

B.4304. *Thermometers and hydrometers.* (Malayan Union.)

B.4306. *Lollipop sticks, and importers of fruit pulp.* (Ireland.)

B.4309. *Silicone product for pan greasing.* (Israel.)

B.4312. *Small machines for printing on glass bottles.* (India.)

B.4314. *Plucking machines for poultry.* (Yorks.)

B.4319. *Machine for skinning onions.* (Warwicks.)

B.4321. *Machinery for making paper bags.* (London.)

B.4322. *Labelling machinery for oval herring cans.* (Norfolk.)

Information Required

B.4357. *Name and address of manufacturers of a fully automatic doughnut machine with an output of 800 doughnuts per hour.* (Lancs.)

B.4382. *Name and address of makers of the Buttapatta butter pat machine.* (Lancs.)

B.4384. *Name and address of manufacturers of a chef's "mandoline"—hand instrument used for cutting various shapes of potato chips.* (Eire.)

Recent Patents

636,756. SUNBEAM CORPORATION: Filter assembly for coffee makers.
636,780. CUSIN, L. M. A.: Method of and machine for making biscuits and similar products.
638,601. MONTGOMERY, F. M.: Industrial trucks.
638,602. MCCONNEL HINDS, LTD., MCCONNEL, F. W., and HINDS, G. A.: Hop-picking machines.
638,611. RAMSEY, A. R. J. (Cory Corporation): Electrically heated beverage brewer.
638,632. SHEET METAL TECHNICIANS, LTD., and LANGTON, J. W.: Metal containers.
638,663. FOOD MACHINERY CORPORATION: Heat treatment of canned evaporated milk.
638,665. WRIGHT'S AUTOMATIC MACHINERY COMPANY: Automatic weighing machine.
638,677. BRITISH THOMSON-HOUSTON CO., LTD.: Supports for food storage receptacles in refrigerators.
638,680. FISHER AND LUDLOW, LTD., and ORWIN, O. J. B.: Conveyors.
638,762. PEDERSON, V. N.: Preservation of fruits and the like goods.
638,776. ROSE BROTHERS (GAINSBOROUGH), LTD., and ROSE, A. G.: Wrapping machinery.

Abstract of a Recent Specification

Vegetable and Fruit Grater Base

This invention relates to a base for a vegetable and fruit grater, slicer, juice remover, peeler, corer, and cutter and in particular to a unit which is provided with a series of members which can be placed upon a base to carry out the various operations required.

The base comprises an upright having near its lower end an outwardly extending bracket, means pivoted to the bracket to carry a peeler, a thumb screw at the end of the bracket to carry a corer, clamping means on the upright co-acting with the bracket to allow the upright to be clamped to a table with part of the bracket resting thereon, a second bracket on the upright on the opposite side to the first said bracket and both it and the bracket being apertured to engage the threaded shaft of a peeler or the plain shaft of a grater, slicer or juice remover, a pivoted lever on the second bracket movable to engage the thread of the peeler shaft, and clamping means near the top of the upright to engage and lock feed guides used with the grater and slicer.

631,241. *William Thomas Whittingslowe.*

Recent patents have been selected from the "Official Journal of Patents" and are published by permission of the Controller of H.M.S.O.

Trade Marks

EATWELL.—662,414. Pilchards, sardines, mackerel, and tuna, all being canned goods. **The French Sardine Company of California** (a Corporation organised under the laws of the State of California, United States of America), Fish Harbor Wharf, Terminal Island, California, United States of America; Canners and Merchants.

RADI-HEAT.—675,503. Fish frying ranges. **Preston and Thomas, Limited,** Woodville Engineering Works, Minny Street, Cardiff; Manufacturers.

KINGPIN.—677,604. Essences and flavourings for food (none being essential oils), ice cream powder, preparations used in the manufacture of ices, invert sugar, vinegar, sauces, and spices. **The General Kaputine Syndicate, Limited,** The Gem Works, Fields New Road, Chadderton, Oldham, Lancashire; Manufacturing Chemists.

ROBINSON'S.—678,736. Barley and groats, all prepared for food for human use. **Keen, Robinson and Company, Limited,** Carrow Works, Norwich; Manufacturers.

HILVONA.—679,327. Mixtures of cheese and whey for use in spreading of foodstuffs, being goods for sale in the Counties of Hampshire (including the Isle of Wight), Oxford, Wiltshire, Gloucester, Somerset, and Dorset. **The Malmesbury and Parsons Dairies, Limited,** also trading as **Edward Phillips and Son,** Hill View Dairies, Okeford Fitzpaine, Blandford, Dorset; Manufacturers.

CEMCO.—680,220. Machines for filling, capping, handling, and conveying containers, and parts of such machines. **Crown Cork and Seal Company, Inc.** (a Corporation organised and existing under the laws of the State of New York, United States of America), 4425, Eastern Avenue, Baltimore, State of Maryland, United States of America; Manufacturers.

CLIMAX.—680,600. Solid glucose for sale in England, Wales, and Scotland. **Corn Products Company, Limited,** Wellington House, 125-130, Strand, London, W.C.2; Manufacturers and Merchants.

MUSCOLACTON.—681,476. Fruit essences (not being essential oils) for use as ingredients in food other than beverages. **Polak and Schwarz (England), Limited,** 50, Great Cambridge Road, Enfield, Middlesex; Manufacturers.

SCUPA.—682,085. Tomato juice and fruit juices (tinned). **Société Chérifienne d'Utilisation de Produits Agricoles** (S.C.U.P.A.), S.A. (a Company incorporated under the laws of France), Boulevard du Commandant Fage, Casablanca, Morocco; Merchants.

MERREX.—682,417. Preparations for making meringues. **Lawrence and Hilton, Limited,** 481, Waterloo Road, Blackpool, Lancashire; Manufacturers.

BEEFEATER.—683,012. Corned beef and canned meats. **International Products Corporation** (a Corporation organised under the laws of the State of Delaware, United States of America), 29, Broadway, New York 6, State of New York, United States of America, and The Frigorifico, San Antonio, near Asuncion, Paraguay; Manufacturers.

COJOL.—683,753. Preparations of cod liver oil and orange juice for medicinal purposes. **The Wilson Malt Extract Company, Limited** (a Company incorporated under the laws of New Zealand), Willowbank, Dunedin, New Zealand; Manufacturers.

SUNRISE.—684,014. Puddings, pastry mixture, amber syrup (for food), golden syrup (for food), tea, ground coffee, cocoa, honey, flavouring essences (other than essential oils), spices, and curry powder. **Sunrise Preserving Co., Limited,** 20, Soho Square, London W.1; Manufacturers.

Trade marks have been selected from the "Official Trade Marks Journal" and are published by permission of the Controller of H.M.S.O.

New Companies

Andanes Steam Fishing Company, Limited. (481287.) Fish Docks, Grimsby. Nom. cap.: £10,000 in £1 shares. Dirs.: J. R. Cobley, Newlands, Great Coates Road (permt. gov. dir.); P. Adalsteinsson, Humberstone Court, New Waltham, Lincs.

Barnett and Roberts, Limited. (481288.) 10, Town Hall Street, Grimsby. To carry on business of fish merchants, curers and salesmen, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: S. M. Barnett, 66, Louth Road, Scarthoe, Grimsby; F. Barnett, 16, Cooper Street, Grimsby.

C. H. Streat and Sons, Limited. (481296.) Ideal Poultry Farm, Thong, near Gravesend. To carry on business of importers and exporters of and dealers in eggs, bacon, poultry, meat, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: C. H. G. Streat (Permt.), Jessie G. Streat, R. C. Streat, and A. G. Streat, all of Ideal Poultry Farm, Thong, near Gravesend.

G. Johnson (Produce), Limited. (481308.) 9, Market Street, Newton Abbot, Devon. To carry on business of greengrocers, fruiterers, nurserymen, etc. Nom. cap.: £500 in £1 shares. Dirs.: to be appointed by subs. Subs.: G. M. Johnson, 26, Forde Road, Newton Abbot; H. W. Brockway, Struma, Islington, Newton Abbot (Acct.).

Arthur Auerhann, Limited. (481339.) 18, Buckingham Street, Adelphi, W.C.2. To carry on business of importers, exporters, and manufacturers of foodstuffs, etc. Nom. cap.: £5,000 in £1 shares. Dirs.: to be appointed by subs. Subs.: A. Auerhann and Mrs. Auerhann, 6, Farm Avenue, N.W.2.

F. R. Miller and Son, Limited. (481401.) Wharncliffe Road, Fish Docks, Grimsby. To take over business of fish merchants carried on as "F. R. Miller and Co." and "J. Bruce Miller" respectively, at Grimsby. Nom. cap.: £2,000 in £1 shares. Permt. dirs.: F. R. Miller (gov. dir.), J. B. Miller, Mrs. M. T. Miller, and Jean Miller, all of 209, Scarthoe Road, Grimsby.

Great Clacton Fruit Farm, Limited. (481403.) The Fruit Farm, Valley Road, Great Clacton, Essex. Nom. cap.: £1,000 in £1 shares. Dirs.: T. E. Crane and Mrs. M. Crane, Collingwood, Bockings Grove, Clacton-on-Sea; T. W. Chapman and Mrs. I. Chapman, 7, Valley Road, Clacton-on-Sea.

C. Minty and Son, Limited. (481426.) Lansdowne House, Stockwood Vale, Keynsham, Somerset. To carry on business of market gardeners, farmers, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: C. Minty, Woodlea House, Stockwood Vale, Keynsham; P. C. Minty, Lansdowne House, Stockwood Vale, Keynsham, Somerset.

F. C. Bradley and Sons (United Farmers), Limited. (481429.) 35, Bow Street, London, W.C.1. To take over business of fruit brokers and produce merchants carried on as "United Farmers" at Reading and Hounslow. Nom. cap.: £8,000 in £1 shares. Dirs.: F. Bradley, Alexander Crescent, Bromley, Kent; A. Bradley, 4, Cromford Way, New Malden, Surrey; P. Bradley, I. Bradley, and H. V. Crouch.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.